

Figure 10 illustrates that, in the TOPS study, almost 64 percent of the patients used heroin at least weekly in the year before treatment; however, about 18 percent used heroin at least weekly in the year after treatment, and about 19 percent continued heroin use weekly 3 to 5 years after treatment (Hubbard, Marsden, Rachal, et al., 1989).

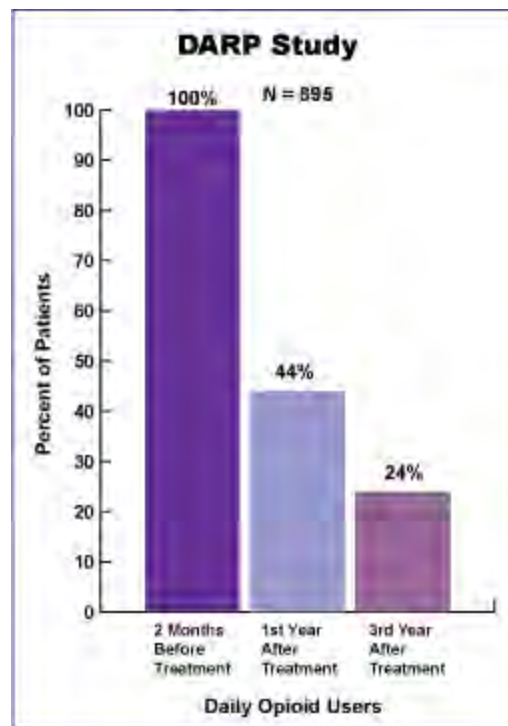


Figure 11 illustrates that in the DARP study, 44 percent of methadone maintenance treatment patients used heroin daily in the year following treatment and 24 percent used heroin daily 3 years after treatment. This represents significant reductions from the 100 percent who had used heroin daily in the 2 months before admission (Simpson and Sells, 1982). Daily illicit opioid use continued to decline steadily for the next 3 years.

DARP: Changes in Illicit Opioid Use: Pretreatment to 12-Year Followup—Among patients in the DARP studies, (1) methadone maintenance treatment resulted in a rapid decline in illicit opioid use and (2) this reduction in illicit opioid use remained steady for 12 years (Simpson and Sells, 1990).

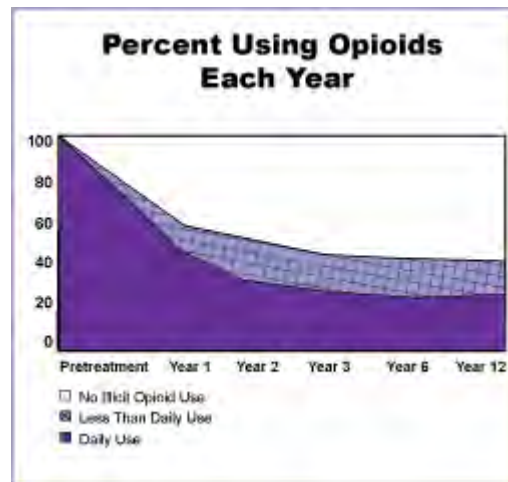


Figure 12 illustrates that improvements among patients who used no illicit opioids and who used opioids less than daily persisted into the 12th year after treatment. About one-half of those patients treated with methadone maintenance reported no illicit drug use after 12 years. The benefits associated with methadone maintenance treatment seem to improve over time. For example, at the end of 1 year, about 50 percent of the subjects reported daily illicit drug use, but by year 12, the proportion using illicit drugs on a daily basis was reduced to about 25 percent (Simpson and Sells, 1990).

Reduction of Heroin Use by Length of Stay in Methadone Maintenance Treatment—The length of stay in methadone maintenance treatment is associated with a reduction in heroin use: longer lengths of stay are associated with greater reductions in heroin use. In addition, leaving methadone maintenance treatment is associated with a return to injection drug use in 82 percent of patients within 1 year (Ball and Ross, 1991).

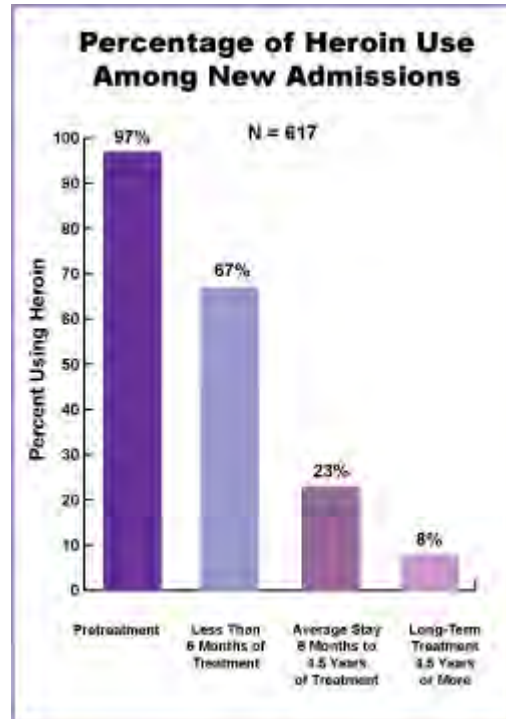


Figure 13 illustrates that heroin use among a group of 617 new admissions was nearly 100 percent. Among patients who stayed in treatment for less than 6 months, about 67 percent reported using heroin. Among patients whose average stay in methadone maintenance treatment was 6 months to 4.5 years, about 23 percent reported using heroin. Among patients who remained in treatment more than 4.5 years, about 8 percent reported using heroin (Ball and Ross, 1991).

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Question 3: Does methadone maintenance treatment reduce HIV risk behaviors and the incidence of HIV infection among opioid-dependent injection drug users?

Answer: Yes. The daily oral administration of adequate dosages of methadone reduces the need for opioid-dependent individuals to inject drugs. By decreasing injection drug use, methadone maintenance treatment helps reduce the spread of diseases transmitted through needle sharing, such as human immunodeficiency virus (HIV) infection, hepatitis C virus (HCV), and other bloodborne infections (Sullivan, Metzger, Fudala, et al., 2005; Gowing, Farrell, Bornemann, et al., in press).

Research Highlights

A systematic review of 23 studies of 7,900 patients in diverse countries and settings reported significant decreases in the following HIV risk behaviors among patients receiving methadone maintenance treatment: (1) the proportion of opioid-dependent injection drugs, (2) the reported frequency of injection, (3) levels of sharing of injection equipment, (4) illicit opioid use, (5) reduction in the proportion of opioid-dependent injection drug users reporting multiple sex partners or exchanges of sex for drugs or money, and (6) reductions in cases of HIV infection among opioid-dependent injection drug users. However, it should be noted that methadone treatment had little or no effect on the use of condoms. The authors concluded that the provision of agonist treatment for opioid dependence should be supported in countries with emerging HIV and injection drug use problems as well as in countries with established populations of injection drug users (Gowing, Farrell, Bornemann, et al., 2004).

These results support an earlier meta-analysis of 11 studies that found a consistent, statistically significant relationship between methadone maintenance treatment and the reduction of HIV risk behaviors. This meta-analysis found that methadone maintenance treatment had a small-to-moderate effect in reducing HIV risk behaviors (Marsch, 1998).

- A study that evaluated HIV risk behavior in patients receiving ongoing methadone maintenance compared with patients receiving 6 months of methadone maintenance followed by detoxification demonstrated that those patients who received ongoing methadone maintenance treatment reported lower HIV drug (but not sex) risk behaviors after 6 and 12 months of treatment (Sees, Delucchi, Masson, et al., 2000).
- In New Haven, CT, 107 methadone-maintained injection drug users who were not in treatment were surveyed regarding their risk behaviors. The frequency of injections was found to be 50 to 65 percent ($p < .001$) higher among the out-of-treatment subjects (Meandzija, O'Connor, Fitzgerald, et al., 1994).
- In a 3-year field study of methadone maintenance treatment programs in New York, NY, Philadelphia, PA, and Baltimore, MD, treatment was found to be effective in reducing injection drug use and needle sharing by most heroin addicts. Of 388 patients who remained in treatment for 1 year or more, 71 percent had stopped injection drug use. Conversely, 82 percent of patients who left treatment relapsed rapidly to injection drug use (Ball, Lang, Meyers, et al., 1988).
- Abdul-Quader, Friedman, Des Jarlais, et al. (1987) reported that both the frequency of drug injection and the frequency of drug injection in shooting galleries were significantly reduced by the amount of time spent in methadone maintenance treatment.
- A study by Serpelloni, Carrieri, Rezza, et al. (1994) examined the effect of methadone maintenance treatment on HIV infection incidence among injection drug users. The study found that the amount of time spent in methadone maintenance treatment was the major determinant in remaining HIV-free, which confirms the effectiveness of long-term programs in reducing the risk of HIV infection. Indeed, the risk of HIV infection increased 1.5 times for every 3 months spent out of methadone treatment in the past 12 months immediately preceding seroconversion. The study noted that higher daily methadone doses were associated with a reduction in HIV infection.

- A study by Weber, Ledergerber, Opravil, et al. (1990) examined the role of methadone maintenance treatment in reducing the progression of HIV infection among 297 current and former injection drug users with asymptomatic HIV infection. The study showed that HIV infection progresses significantly more slowly in those who receive methadone maintenance treatment and those who are drug free than in active injection drug users.
- In Philadelphia, PA, a longitudinal study of HIV infection and risk behaviors among 152 injection drug users in methadone maintenance treatment and 103 out-of-treatment injection drug users found significantly lower rates of risk behavior, including needle sharing, injection frequency, shooting gallery use, and visits to crack houses among the methadone-maintained users. While 70 percent of the out-of-treatment cohort reported sharing needles during the 6 months before entry into the study, only 30 percent of those in treatment reported sharing needles during this same interval.
- At entry into this study, 18 percent of the out-of-treatment subjects and 11 percent of the methadone-maintained clients tested positive for antibodies to HIV. After 18 months of study, 33 percent of the out-of-treatment cohort were infected, whereas 15 percent of the methadone clients tested positive ($p < 0.01$). The incidence of new infection was strongly associated with the level of participation in methadone treatment. Among those who remained in methadone treatment for the entire 18-month study period, 3.5 percent became infected. Among those who remained out of treatment, 22 percent became infected with HIV (Metzger, Woody, McLellan, et al., 1993).
- Another study of HIV seroconversion followed 56 patients who were continuously enrolled in methadone maintenance and compared them with 42 patients who had intermittent methadone treatment. Subjects in continuous treatment had a seroconversion rate of 0.7 per 100 person years (95% CI = 0.1, 5.3), and those with interrupted treatment had a rate of 4.3 per 100 person years (95% CI = 2.2, 8.6) (Williams, McNelly, Williams, et al., 1992).
- A relatively short-term study of methadone maintenance versus control in a prison system in Australia found reductions in opioid use but no changes in HIV or HCV incidence (Dolan, Shearer, MacDonald, 2003).

The following two visuals—HIV Infection Rates by Methadone Maintenance Treatment Status and 18-Month HIV Seroconversion by Methadone Maintenance Treatment Retention—depict findings from this study.

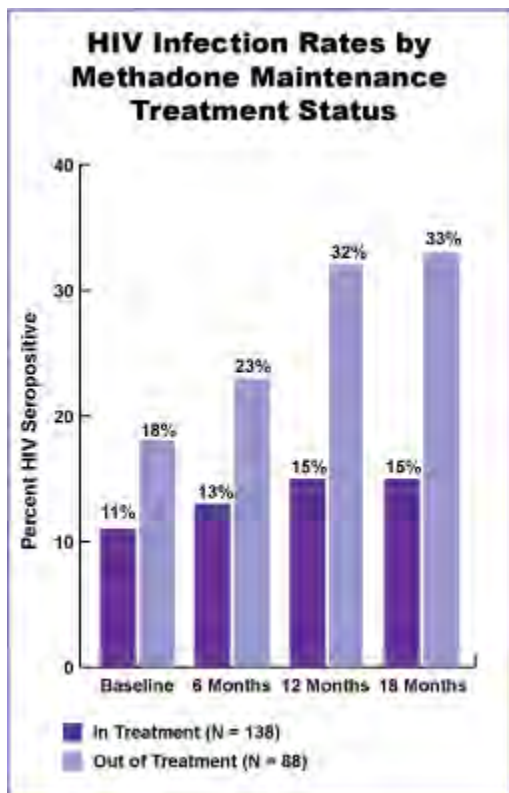


Figure 14 illustrates that at the beginning of this study, 18 percent of the out-of-treatment subjects and 11 percent of the methadone-maintained clients tested positive for antibodies to HIV. After 18 months, nearly twice as many (33 percent) of the out-of-treatment cohort were HIV-positive, whereas only 15 percent of the methadone clients tested positive ($p < .01$). The incidence of new infection was strongly associated with the level of participation in methadone treatment.

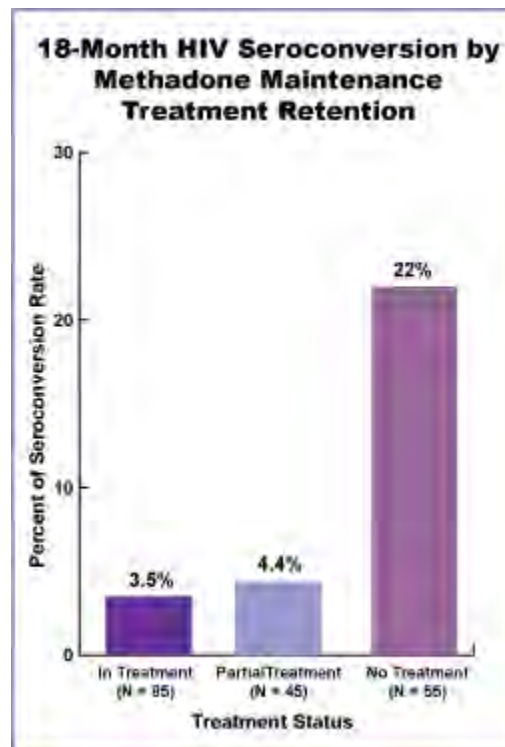


Figure 15 illustrates that among those who remained in methadone maintenance treatment for the entire 18-month study period, 3.5 percent became infected with HIV. Among those who remained out of treatment, 22 percent became infected with HIV (Metzger et al., 1993).

Rapid Return to Injection Drug Use Following Premature Termination of Methadone Maintenance Treatment—In a 3-year field study of methadone maintenance treatment programs in New York, NY, Philadelphia, PA, and Baltimore, MD, methadone maintenance treatment was found to be effective in reducing injection drug use and needle sharing by most heroin addicts. Of 388 patients who remained in treatment for 1 year or more, 71 percent had stopped injection drug use. Conversely, 82 percent of the 105 patients who left treatment relapsed rapidly to injection drug use (Ball et al., 1988).

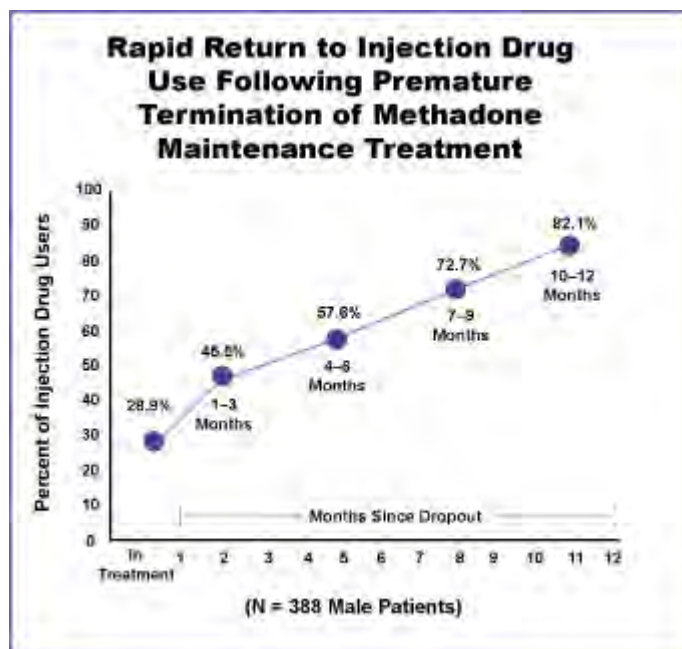


Figure 16 illustrates that methadone maintenance treatment is associated with reductions in injection drug use and the risks related to HIV infection. When drug users leave methadone maintenance treatment prematurely, they have an increased likelihood of returning to injection drug use (Ball et al., 1988).

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Question 4: Does methadone maintenance treatment reduce criminal activity?

Answer: Yes. Patients are less likely to become involved in criminal activity while in methadone maintenance treatment.

- Patients who remain in methadone maintenance treatment for long periods of time are less likely to be involved in criminal activity than patients in treatment for short periods.
- The availability of methadone maintenance treatment in a community is associated with a decrease in that community's criminal activity, particularly theft.

Research Highlights

- In a meta-analysis of 24 studies, results indicate an overall small-to-medium effect of $r = -0.25$ (unweighted) of the impact of methadone maintenance on criminal activity. A large effect size of $r = 0.70$ (unweighted) was seen in those studies that investigated the efficacy of methadone maintenance treatment in reducing drug-related criminal behaviors. A small-to-moderate effect of $r = 0.23$ (unweighted) was obtained when both drug and property-related criminal activities were evaluated. Finally, a small effect of $r = 0.17$ (unweighted) was demonstrated when drug- and nondrug-related criminal behaviors were combined (Marsch, 1998).
- In the Treatment Outcome Perspective Study (TOPS), 32 percent of the methadone maintenance patients acknowledged committing one or more predatory crimes in the year before treatment, but only 10 percent continued these activities during treatment. By 3 to 5 years after leaving treatment, only 16 percent of the patients reported predatory criminal activity—a reduction of one-half the pretreatment level (Hubbard, Marsden, Rachal, et al., 1989).
- Among the 617 patients studied by Ball and Ross (1991), there was a 70.8-percent decline in crime-days within the 4-month methadone maintenance treatment period. This decline was followed by continuing, but less dramatic, declines in mean crime-days among those in treatment for 1 to 3 years. Those in treatment for 6 or more years had the lowest rate of crime-days per year (14.5).
- The Powers and Anglin (1993) retrospective study of 933 heroin addicts demonstrated that rates of criminality, arrests, and drug dealing decreased during episodes of methadone maintenance treatment when compared with addicts not in treatment.
- In the National Treatment Outcome Research Study, acquisitive criminal behavior decreased in the majority of the 333 patients except those ($n = 88$) who were felt to have a poor treatment response. In these patients, there was no change in this type of criminal activity (Gossop, Marsden, Stewart, et al., 2000).
- The meta-analysis by Mattick, Breen, Kimber, et al. (2003) revealed that criminal activity declined in consort with reductions in heroin use, although the advantage for methadone beyond control in reducing criminal activity was not statistically significant (3 studies, 363 patients: $RR = 0.39$, 95% CI: 0.12-1.25).

The Effects of Methadone Maintenance Treatment on Crime-Days—The Ball and Ross study (1991) of 617 patients demonstrated that methadone maintenance treatment is associated with a dramatic decline in the average number of crime-days per year.

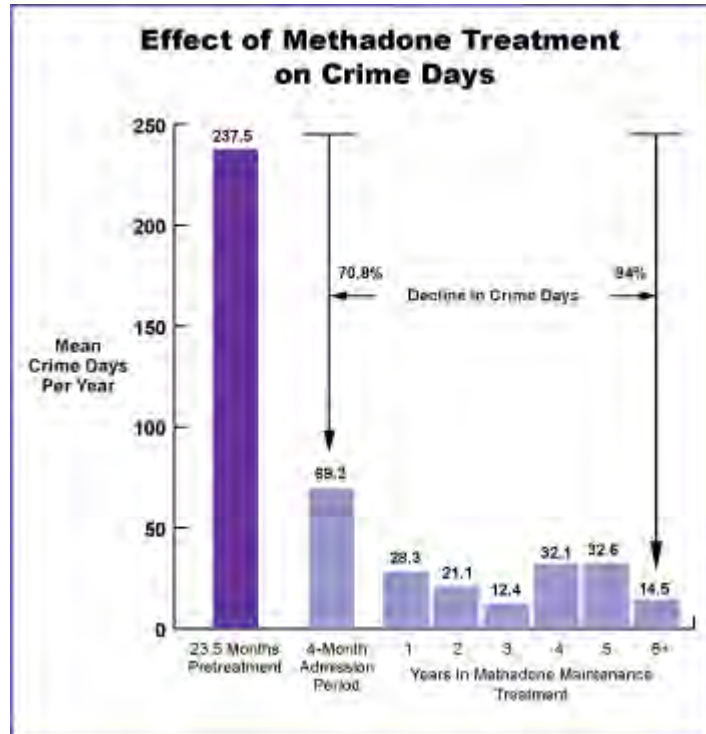


Figure 17 illustrates that the average number of crime-days per year before treatment was 237. During the 4-month initial methadone maintenance treatment, the average number of crime-days per year was 69. This represents about a 71-percent decline. This dramatic decline was followed by continuing, but less dramatic, declines in the average number of crime-days among those in methadone maintenance treatment for 1 to 3 years. Patients who remained in methadone maintenance treatment for 6 or more years reported only 14.5 crime-days per year, representing a 94-percent decline in average number of crime-days (Ball and Ross, 1991).

Crime Before and During Methadone Maintenance Treatment at Six Programs—Ball and Ross (1991) found a dramatic decline in crime when comparing pretreatment crime-days per year and the number of crime-days per year after 6 months or more in methadone maintenance treatment.

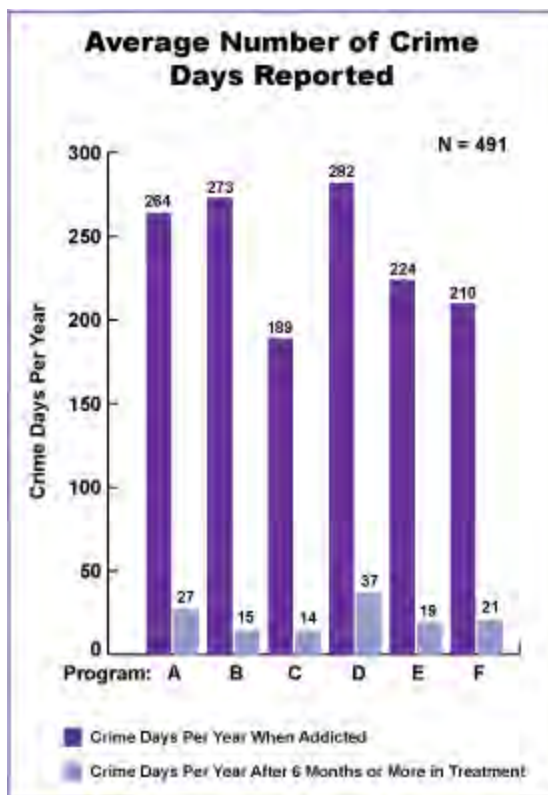


Figure 18 illustrates the average number of crime-days reported by patients in six methadone maintenance treatment programs. Although there are differences among programs, the dramatic decrease in crime-days before and during methadone maintenance treatment occurs for all six programs. Crime was reduced by approximately 90 percent in program A, 95 percent in program B, 93 percent in program C, 87 percent in program D, 92 percent in program E, and 90 percent in program F. The average reduction in crime for those in methadone maintenance treatment was just over 91 percent (Ball and Ross, 1991).

The cost benefits of methadone maintenance treatment become obvious when one compares the costs of providing treatment with the social costs that would have occurred if the crime level had continued.

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Question 5: Does methadone maintenance treatment improve the likelihood of obtaining and retaining employment?

Answer: Yes. The likelihood of becoming and remaining employed is increased for patients who participate in methadone maintenance treatment.

- In an early study of 100 chronic heroin users who were admitted to methadone maintenance treatment, the employment rate increased from 21 percent at admission to 65 percent 1 year later (Maddux and McDonald, 1973; Maddux and Desmond, 1979).
- A study of 92 males admitted to methadone maintenance treatment programs from 1971 through 1973 demonstrated that, following methadone maintenance treatment, employment increased about 18 percent (Harlow and Anglin, 1984).
- In a 10-year followup study, 95 chronic opioid users who spent at least 1 cumulative year in methadone maintenance treatment were compared with 77 chronic opioid users who spent less than 1 cumulative year in methadone maintenance treatment. Those who were on methadone maintenance treatment for more than 1 year had a higher average time employed (mean of 42 months) than those who were in treatment for less than 1 year (mean of 35 months) (Maddux and Desmond, 1992).
- The Powers and Anglin (1993) study of 933 heroin addicts in methadone maintenance treatment demonstrated that rates of employment (and marriage) increased during treatment.
- Methadone maintenance patients in the Treatment Outcome Perspective Studies (TOPS) had small changes in employment rates during and following treatment compared with pretreatment rates. Although 24 percent of the patients reported full-time employment in the year before admission, this rate did not increase significantly during treatment. It declined abruptly in the 3 months following discharge, improved to 29 percent by year 2, and dropped off again to less than pretreatment rates by years 3 to 5 following treatment (Hubbard, Marsden, Rachal, et al., 1989).
- In a study that compared ongoing methadone maintenance with 6 months of methadone maintenance followed by detoxification, no difference was seen in employment, although nearly 50 percent of patients were employed at entry into the study (Sees, Delucchi, Masson, et al., 2000). Similarly, a study comparing methadone maintenance with methadone-free treatment saw improvements in both groups over time but no difference in outcomes across treatment type (Abbot, Moore, Delaney, et al., 1999). The McLellan trial, which evaluated varying levels of ancillary services, provides some insight into these negative findings. Specifically, the group of patients in the McLellan trial that received enhanced psychosocial services (including employment counseling) was noted to have improvements in employment status with methadone treatment compared with patients who received no or standard services (McLellan, Arndt, Metzger, et al., 1993).

Changes in Employment During and After Methadone Maintenance Treatment—Figures 19 and 20 illustrate the effects of methadone maintenance treatment on full-time employment as demonstrated by the TOPS and DARP studies. In one study, there was little effect, but in the other, methadone maintenance treatment was associated with significant increases in full-time employment.

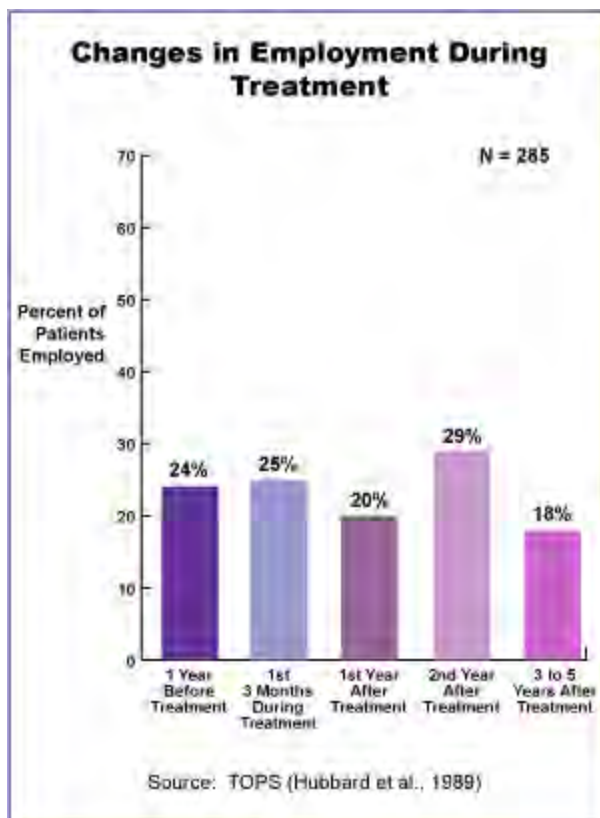
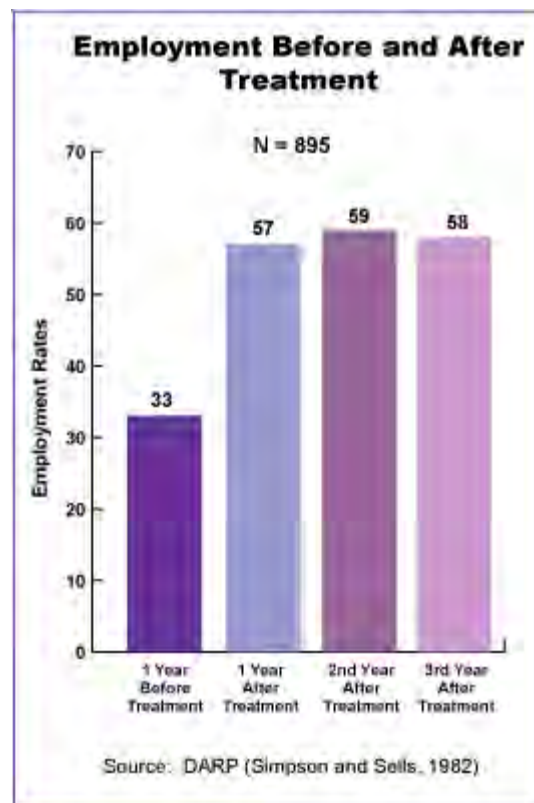


Figure 19 illustrates that patients in TOPS studies experienced small and inconsistent changes in full-time employment rates during and after treatment. Employment rates were about 24 percent 1 year before treatment, ranged from 20 to 25 percent during the first year after treatment, rose to 29 percent during the second year after treatment, and declined to 18 percent 3 to 5 years after treatment (Hubbard et al., 1989).



In contrast, Figure 20 illustrates that the DARP studies reported an abrupt increase from 33-percent full-time employment before treatment to nearly 60 percent after treatment (Simpson and Sells, 1982).

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Question 6: What effect can methadone maintenance treatment have on the use of alcohol and other drugs?

Answer: Research outcomes are mixed regarding the effect of methadone maintenance treatment on the use of illicit drugs other than opioids. That is, some research indicates that methadone maintenance treatment is associated with decreases in the use of alcohol, cocaine, and marijuana; other research indicates increases in the use of these drugs. It is important to note that the medication methadone has no direct effect and is not intended to have an effect on rates of alcohol and other drug use. Patients receiving methadone maintenance who disengage from interactions with others who are actively using drugs are less likely to engage in these behaviors. In addition, reductions in alcohol and drug use result from the counseling services included in methadone maintenance treatment. When these services are specifically designed to reduce alcohol and other drug use, such reductions are likely.

Research Highlights

- In the Drug Abuse Reporting Program (DARP) studies, there were reductions in nonopioid drug use (except marijuana) among 895 methadone maintenance patients, comparing the 2-month period before admission and the year following discharge. The reduction in nonopioid use was 13 percent—from 54 percent of patients who reported any use before admission to 41 percent at the 1-year followup point (Simpson and Sells, 1982).
- In the 12-year DARP followup study, “heavy drinking” was reported by 21 percent of the sample in the month before treatment; it rose to 31 percent during the first year afterward and then declined to 22 percent by year 12. One-half of the patients reported substituting alcohol for opioids after stopping daily illicit opioid use (Lehman, Barrett, and Simpson, 1990).
- In a study comparing buprenorphine maintenance with methadone maintenance for patients with opioid dependence and cocaine abuse, both treatments resulted in significant declines in opioid use but were indistinguishable in terms of their effect on comorbid cocaine use (Schottenfeld, Pakes, Oliveto, et al., 1997).

Methadone Maintenance Treatment and General Drug Abuse—Among three cohorts of new-admission patients in methadone maintenance treatment, Ball and Ross (1991) found that the use of all illicit drugs, except marijuana, decreased markedly in relation to time in treatment. These three cohorts had been in treatment 6 months, 4.5 years, or more than 4.5 years.

In the Treatment Outcome Perspective Study (TOPS), 90 percent of methadone maintenance treatment patients who reported drug use at intake reported a reduction in use during the first 3 months of treatment. For 80 percent, this reduction is large. In the year before treatment, less than 10 percent of methadone maintenance treatment patients were minimal drug users. During treatment, more than 50 percent of the patients were minimal drug users. During the 3 to 5 years after discharge, less than 32.5 percent were minimal drug users (Hubbard, Marsden, Rachal, et al., 1989).

In the National Treatment Outcome Research Study (NTORS), of 333 patients receiving methadone maintenance in the United Kingdom, overall declines were seen in the use of heroin, barbiturates, amphetamines, cocaine, and crack cocaine among patients receiving methadone maintenance. Alcohol use, however, did not change over time (Gossop, Marsden, Stewart, et al., 2000).

In another evaluation of 513 heroin users in methadone treatment in TOPS, a decline was observed in the use of cocaine, amphetamines, illegal methadone, tranquilizers, and marijuana, but not alcohol (Fairbank, Duntzman, and Condelli, 1993).

The Powers and Anglin study (1993) of 933 heroin addicts in methadone maintenance programs demonstrated that during episodes of methadone maintenance treatment, illicit opioid use decreased, but

alcohol and marijuana levels increased moderately. Kreek (1991) observed that by 1990, alcoholism was identified in 40 or 50 percent of new admissions to methadone maintenance treatment programs, and cocaine abuse was found in 70 to 90 percent. She also estimated that 20 to 46 percent of patients in effective methadone maintenance treatment programs continue using cocaine, and 15 to 20 percent of methadone maintenance treatment patients regularly inject cocaine.

Methadone Maintenance Treatment and Cocaine Use—Among the TOPS patients who remained in methadone maintenance treatment at least 3 months, 26.4 percent had used cocaine regularly the year before treatment. This rate fell to 10 percent during the first 3 months of treatment but returned to 16 percent by 3 to 5 years after discharge. Altogether, 40 percent of methadone maintenance treatment patients who regularly used cocaine before treatment and stayed in treatment for at least 3 months abstained from cocaine use in the year after treatment (Hubbard et al., 1989).

In the TOPS studies, although 70 percent of heroin abusers had frequently used cocaine the year before treatment, it was the primary drug of choice for only 2 percent of methadone maintenance treatment patients (Hubbard et al., 1989).

In the new admissions group of a six-program study (n = 345), 46.8 percent of 126 patients had used cocaine in the past 30 days. Among the average-stay group (up to 4.5 years in treatment), 27.5 percent still used cocaine; this rate dropped to 17.2 percent among the long-term group of 146 patients who had been in continuous treatment for more than 4.5 years (Ball and Ross, 1991).

A study evaluating the effect of methadone dose on treatment outcomes noted that patients receiving 50 mg of methadone, compared with those receiving 20 mg or 0 mg, had a reduced rate of opioid-positive urine samples (56.4% vs. 67.6% and 73.6%, respectively; $p < 0.05$) and cocaine-positive urine samples (52.6% vs. 62.4% and 67.1%, respectively; $p < 0.05$) (Strain, Stitzer, Liebson, et al., 1993).

A systematic review examined the impact of methadone dose on cocaine use and found three studies that addressed the question. Results from the one study in which cocaine use was based on self-reported use showed no significant excess of use of cocaine among subjects treated with higher doses compared with subjects treated with lower doses. Pooled results from the two studies that used urine analysis and looked at an abstinence period longer than 3 weeks showed that higher methadone doses increased the probability that patients would stay abstinent from cocaine, compared with lower doses (RR = 1.81 [1.15, 2.85]) (Faggiano, Vigna-Taglianti, Versino, et al., 2003).

Methadone Maintenance and Marijuana Use—Among TOPS subjects, marijuana use was common: 55 percent of methadone maintenance patients who stayed in treatment for 3 months reported regular use in the year before admission. This decreased to 47 percent during the first 3 months of treatment, continued to decline immediately posttreatment, and decreased even more to 36.4 percent in the 3- to 5-year period after discharge. However, marijuana use appeared more resistant to change than other illicit substances (Hubbard et al., 1989). It should be considered that the treatment programs likely did not clinically address marijuana or other drug use.

Ball and Ross (1991) found that marijuana continued to be used quite regularly (an average of 13 to 16 days per month) by high percentages of all patient groups in methadone maintenance treatment: 48.4 percent of the new admissions, 47.7 percent of the average-stay group, and 37.2 percent of the patients in treatment more than 4.5 years.

In one study of 132 opioid addicts participating in methadone maintenance treatment programs, it was noted that during episodes of methadone maintenance treatment, levels of alcohol and marijuana use increased modestly (Powers and Anglin, 1993).

Methadone Maintenance and the Nonmedical Use of Prescription Drugs—In the TOPS studies, the regular nonmedical use of psychoactive prescription drugs by methadone maintenance treatment patients during the first posttreatment year decreased by one-third from the pretreatment period. Although 30.3 percent of this methadone maintenance group reported regular nonmedical use of prescription drugs (i.e., barbiturates, amphetamines, tranquilizers, sedatives, and hypnotics), nonmedical prescription drug use was a primary problem for only 1.9 percent of these patients at admission (Hubbard et al., 1989).

In the NTORS study, a decline was seen in the use of benzodiazepines among patients receiving methadone maintenance (Gossop et al., 2000). In the TOPS studies, nonmedical prescription drug use declined during methadone maintenance treatment, increased immediately following discharge, and declined again to 10 percent of patients 3 to 5 years following discharge (Hubbard et al., 1989).

Ball and Ross (1991) found that although the nonmedical use of sedatives other than barbiturates was acknowledged by 31.8 percent of new admissions to methadone maintenance treatment, the percentage of sedative-using patients who had been in treatment for more than 4.5 years was less than half that of the new admission group (14.5 percent).

Methadone Maintenance Treatment and Alcohol and Other Drug Use—In the TOPS studies, improvements in the use of illicit and nonprescription drugs follow a pattern of (1) a dramatic reduction during treatment, (2) a sharp increase immediately after discharge, and (3) a leveling off at an impressively reduced rate for up to 5 years of followup contacts (Hubbard et al., 1989).

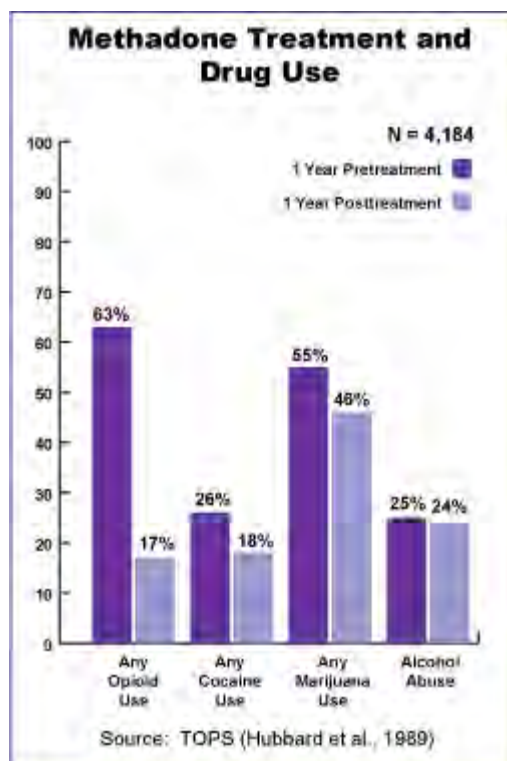


Figure 21 illustrates that as reported by the TOPS study of 4,184 patients, methadone maintenance treatment was associated with reductions in (1) any illicit opioid use, (2) any cocaine use, (3) any marijuana use, and (4) alcohol abuse (the 1-percent reduction noted here is not statistically significant) (Hubbard et al., 1989).

“Any opioid use” declined from 63 percent pretreatment to 17 percent 1 year posttreatment. This was the most dramatic decline. “Any cocaine use” declined from 26 percent to 18 percent. “Any marijuana use” declined from 55 percent pretreatment to 46 percent 1 year posttreatment. Alcohol abuse remained almost steady, declining slightly from 25 percent to 24 percent.

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Question 7: What components of methadone maintenance treatment account for reductions in AIDS risk behaviors?

Answer: Reductions in drug use and related AIDS risk behaviors among methadone-maintained individuals have been associated with both physiological and psychosocial factors. Recent studies have confirmed that adequate methadone dose levels are required to achieve significant reductions in opioid abuse. At the same time, research has demonstrated that methadone alone will have, at best, limited impact. Additional psychosocial support services are needed to maximize the effectiveness of methadone maintenance treatment.

Research Highlights

- A study examining the impact of psychosocial services in methadone treatment found that outcomes were significantly improved for those injection drug users who received services in addition to methadone (McLellan, Arndt, Metzger, et al., 1993). In this study, methadone patients were randomly assigned to one of three groups that received either: (1) methadone alone with no other services; (2) methadone and regular counseling; or (3) methadone with counseling and medical/psychiatric services, employment services, and family therapy. Although methadone doses were the same in each group, outcomes were significantly better in the groups that also received psychosocial services. Sixty-nine percent of the methadone-only group had to be “protectively transferred” due to unremitting use of opiates or cocaine or medical/psychiatric emergencies.
- Counseling programs specifically designed to reduce HIV risk behavior among methadone-maintained patients have been shown to be effective (Margolin, Avants, Warburton, et al., 2003).
- Patients with comorbid psychiatric disease are less likely to decrease their HIV risk behaviors during methadone maintenance treatment, compared with those without, although both groups receive benefit (King, Kidorf, Stoller, et al., 2000).
- A study of 291 patients that evaluated a high-intensity day treatment along with methadone versus enhanced methadone treatment saw decreases in drug use and HIV risk behavior in both groups; however, the study was unable to detect a significant difference in these outcomes between treatment groups (Avants, Margolin, Sindelar, et al., 1999).
- Similarly, a study that compared methadone dose (50 mg vs. 80 mg) and visit frequency (two visits per week vs. five visits per week) saw reductions in HIV risk behavior with methadone maintenance treatment but was unable to demonstrate a difference in HIV risk reduction between the four groups (Rhoades, Creson, Elk, et al., 1998).
- Hartel, Schoenbaum, Selwyn, et al. (1995) examined the drug use patterns and treatment characteristics of 652 methadone patients receiving treatment from the Montefiore Methadone Treatment Program in New York. The study found that those who were maintained on less than 70 mg per day of methadone were 2.1 times ($p < .005$) more likely to be using heroin. It is important to note that the observed effects of higher doses were found even after controlling for the length of time in treatment.
- A meta-analysis of HIV risk reduction interventions in substance abuse treatment programs found that these programs succeeded in changing knowledge, attitudes, and beliefs; sexual behavior; and injection practices. The impact of the intervention programs was negatively correlated with the presence of ethnic/minority samples and positively correlated with the number of intervention techniques used, the intensity of the intervention, interventions that were delivered within methadone treatment, and specific intervention techniques (Prendergast, Podus, Chang, et al., 2002).

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Question 8: Do risk factors for HIV infection acquisition and transmission differ for women compared with men in methadone maintenance treatment?

Answer: Yes. Despite nearly equal HIV infection rates for men and women in drug treatment, female injection drug users differ from males in the types and contexts of their risk behaviors. While the main HIV infection risk for both male and female injection drug users is needle sharing, women frequently support themselves and their addiction habit through sex work and are more likely to have an injection drug user as a sexual partner. The most common needle-sharing context for women is with their sex partners.

In addition, women may transmit HIV infection to their infants in utero, during delivery, or through breastfeeding. Women in methadone treatment need HIV infection prevention programs that take these gender differences into account.

Research Highlights

- Patterns of needle sharing are different for males and females. Women tend to share needles in the context of a sexual relationship. This type of needle sharing may be more difficult to change than other types of injection risk behavior because the perception of risk or ability to negotiate safe needle use by women may be limited. In research conducted among 19,716 males and 6,609 females in the National AIDS Demonstration Research (NADR) project addressing street-recruited injection drug users, women were more likely than men to share needles with their sex partners. The majority of the participants injected only heroin or heroin in combination with cocaine (Brown and Weissman, 1994).

Research in other countries has shown a tendency for female injection drug users to share needles with their sex partners. For example, women in Glasgow, Scotland, were frequently injected with used needles and syringes from their partners (Barnard, 1993).

- Sexual risk behavior has been shown to be less likely to change among both male and female injection drug users than needle-sharing risk behavior. In addition, women who inject drugs are less likely than men to be in control of safer sex practices, such as condom use. Although methadone maintenance treatment may reduce drug use and prostitution or the exchange of sex for drugs, women may be at risk for HIV infection by their habitual sex partners. Female injection drug users tend to have drug users as sex partners, even after enrollment in treatment, and are not likely to practice safer sex with these partners. HIV risk reduction programs for women in methadone maintenance treatment must take into account the social and interpersonal context of sexual risk behavior in order to be effective (Finnegan, Davenny, and Hartel, 1993; Hartel, 1994).
- Women with HIV who are maintained on methadone may improve their access to medical care for HIV infection and disease and possibly reduce their chance of transmitting HIV to infants in utero. Both zidovudine (AZT) and nevirapine have been shown to reduce significantly the risk of mother-to-infant transmission of HIV infection (Connor, Sperling, Gelber, et al., 1994; Brocklehurst and Volmink, 2002).
- It is likely that some infants are infected during labor and delivery or after delivery through breastfeeding. Careful attention to factors that can place the infant at risk during birth and afterwards is needed to further reduce infant infection. In areas with a high community level of HIV infection among injection drug users, methadone programs often incorporate HIV primary health care services into the treatment program through onsite services or linkages to services nearby. These services often include obstetrical care by providers skilled in working with HIV-infected women (Finnegan et al., 1993).

Differences Between Men and Women in HIV Infection Rates and Risk Behaviors—Figure 22 illustrates that overall HIV infection rates are roughly the same for males and females entering drug abuse treatment in the United States: 5.4 percent for males and 4.4 percent for females. These rates vary greatly (0 to 48 percent) by geographic area, with the highest rates found in urban centers that have the greatest density of injection drug users (Allen, Onorato, and Green, 1992).

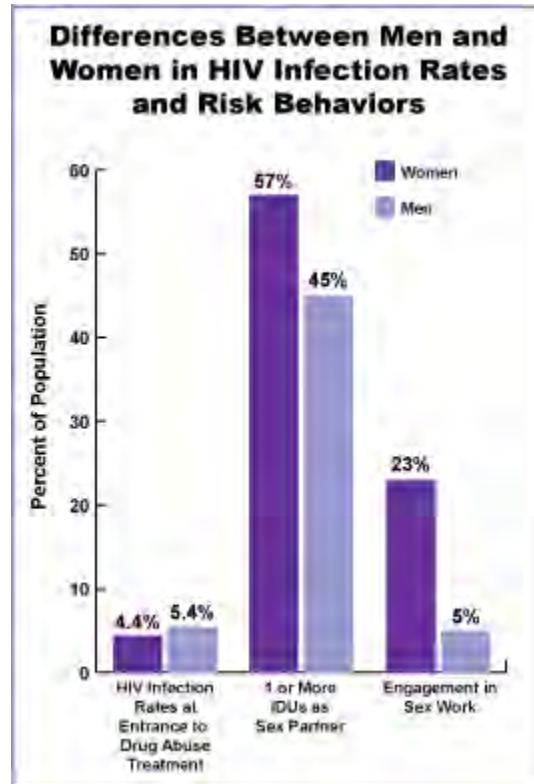


Figure 22 illustrates that overall HIV infection rates are roughly the same for men and women entering drug abuse treatment in the United States: 5.4 percent for men and 4.4 percent for women. These rates vary greatly (0 to 48 percent) by geographic area, with the highest rates found in urban centers that have the greatest density of injection drug users (Allen et al., 1992).

In research conducted in New York, NY, among 452 methadone-recruited injection drug users early in the HIV epidemic, having an injection drug user as a sex partner was associated with HIV infection status independent of or in addition to injection risk behavior. In this same study, women reported a higher level of sexual risk behavior than men: 57 percent of women compared with 45 percent of men reported one or more injection drug users as sex partners since 1978. In addition, women were more likely than men to have engaged in sex work: 23 percent of women compared with 5 percent of men (Schoenbaum, Hartel, Selwyn, et al., 1989).

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Question 9: Is methadone maintenance treatment effective for women?

Answer: Yes. Since the earliest methadone maintenance treatment programs in the United States, women have been treated successfully with methadone through all phases of their lives, including pregnancy. There is consensus that the major outcomes of the effectiveness of methadone maintenance treatment, especially cessation of illicit drug use and lifestyle stabilization, apply to both men and women. However, gender-specific issues, which are often related to the social status of women, are important to treatment effectiveness for female injection drug users.

Compared with men, women are more likely to

- Have total responsibility for child care
- Have lower socioeconomic status
- Encounter greater barriers to treatment entry, retention in treatment, and economic independence
- Have different psychological, counseling, and vocational training needs
- Have difficulty with transportation to treatment.

Research Highlights

- In the past, little emphasis was placed on gender-specific biopsychosocial problems in drug treatment. One reason was the predominance of drug-addicted men, estimated in the United States to be three males to every female. Although mild forms of psychoactive substance use show converging usage rates and patterns for males and females, opioid addiction and other forms of chemical dependency continue to show a male predominance (Kandel, 1992).
- Drug Abuse Reporting Program (DARP) studies showed that 19 to 28 percent of admissions to drug treatment programs from 1969 to 1973 were women. In 12 years of followup of 84 females and 91 males in methadone maintenance, there were no differences between men and women in overall reduction of opioid use. Women required more government financial assistance and had lower rates of employment than men. Compared with men, women were more likely to enter treatment for health reasons (Simpson, 1990; Marsh and Simpson, 1986).
- A study of 567 methadone-maintained patients in California found overall shorter duration of time from first entry to first discharge from treatment for women compared with men (Anglin, Hser, and Booth, 1987). Factors related to poor retention of women in treatment were likely to be a lack of child care and inadequate social and psychological support from domestic partners and other family members (Rosenbaum, 1981; Murphy and Irwin, 1992).
- A study of white, Latina, and African American women in methadone maintenance found that, in general, Latinas were more likely to report familial influences and to display evidence of low self-esteem and self-efficacy, inconsistent condom use, and high-risk injection behavior. White women reported the highest levels of regular condom use at followup; however, they were the least likely to report safer injection practices. African American women expressed the highest levels of self-esteem, yet they reported more alcohol use at intake and crack cocaine use both before and after treatment entry. African American women showed the greatest gains in adopting safer injection practices and were the least likely to report multiple sex partners after treatment entry (Grella, Annon, and Anglin, 1995).
- Drug-using women are likely to experience clinical depression, anxiety disorders, and low self-esteem to a much greater degree than their male counterparts. Women entering treatment have experienced unique gender-specific life events. In particular, female drug users often have been abused physically, sexually, and emotionally. Experiences of sexual violence, especially during childhood, have profound, lifelong psychological effects and often underlie addiction, complicating successful recovery. Methadone maintenance treatment of women requires

awareness of these issues and appropriate counseling. Confrontational styles of therapy and counseling are not effective for most women in treatment (Mondanaro, 1987; Marsh and Miller, 1985; Beschner, Reed, and Mondanaro, 1981; Hartel, 1989/1990).

Potential Treatment Issues for Women—Figure 23 delineates key treatment issues derived from the discussion above.

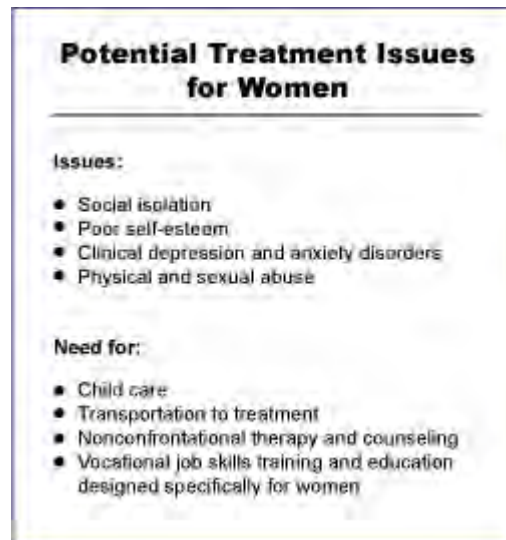


Figure 23 illustrates the potential treatment issues for women.

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Question 10: Is methadone safe for pregnant women and their infants?

Answer: Yes. Since the early 1970s, methadone maintenance treatment has been used successfully with pregnant women. There is consensus that methadone can be safely administered during pregnancy with little risk to mother and infant. Maintenance on methadone is necessary to prevent relapse to illicit opioid use and thus to maintain optimal health during pregnancy.

Research Highlights

A systematic review revealed that randomized controlled studies of methadone treatment in pregnancy demonstrate an approximate threefold reduction in heroin use and a threefold increase in retention in treatment relative to nonpharmacologic treatment (Rayburn and Bogenschutz, 2004).

- All drug-using women are considered to be at higher-than-normal risk for medical and obstetrical complications. Methadone-maintained women show a far greater improvement in obstetrical health than untreated women. Hepatitis types A, B, and C and other sexually transmitted diseases; bacterial endocarditis; septicemia; and cellulites are common among active injection drug users, particularly those who share needles. Women maintained on methadone who have stopped illicit drug use and injection before pregnancy are less likely to experience these and other medical complications during pregnancy. Obstetrical complications such as spontaneous abortion, placental insufficiency, and other conditions also occur at a lower rate among methadone-maintained women than among opioid-dependent women not enrolled in treatment. When compared with opioid-addicted women not in treatment, women in methadone maintenance treatment have been observed to maintain better overall health and nutritional status during pregnancy because of stability provided through treatment. In addition, methadone clinics can provide onsite prenatal services or link patients to these services in nearby clinics, coordinating addiction treatment and prenatal care to optimize both (Finnegan, 1991; Kaltenbach, Silverman, and Wapner, 1993).
- Some women in methadone maintenance treatment are infected with HIV before pregnancy. Treatment programs that link women to appropriate medical care during pregnancy may reduce the burden of illness suffered by HIV-infected women. In a study of 191 methadone-maintained women in a New York City clinic with extensive medical linkages, medical and obstetrical complications did not differ among women with and without HIV infection. HIV infection occurred among 37 percent of women, most of whom were asymptomatic for HIV disease and AIDS before pregnancy. Adverse birth outcomes were relatively infrequent and occurred at approximately the same rates as observed in studies of methadone-maintained women before the HIV epidemic (Selwyn, Schoenbaum, Davenport, et al., 1989).
- U.S. research in the 1970s demonstrated that methadone does cross the placenta. Passive exposure to methadone in utero can result in neonatal abstinence syndrome among exposed infants. The syndrome varies considerably and depends on a number of factors, including the use of other drugs during pregnancy, anesthesia during delivery, the maturational and nutritional status of the infant, and other aspects of maternal health that affect the fetal environment. The relationship of maternal methadone dose in the last trimester of pregnancy has been explored in a number of studies, but results have not consistently delineated a dose-response relationship between maternal dose and severity of infant abstinence syndrome. For those neonates experiencing withdrawal, the length and severity of the withdrawal vary greatly; however, pharmacotherapy for neonatal methadone abstinence syndrome is simple and effective. Methadone maintenance treatment affords protection of the fetus from erratic maternal opioid levels and repeated episodes of withdrawal typically seen in users of illicit opioids (Finnegan, 1991).

- The majority of infants exposed to methadone in utero are healthy and have fewer adverse outcomes than infants exposed to heroin and other illicit drugs. Methadone maintenance treatment for pregnant women can reduce in utero growth retardation and neonatal morbidity and mortality, in comparison with women not in treatment (Finnegan, 1991). Such infants may be smaller at birth than nondrug-exposed infants, but differences tend to disappear over time. A careful review of the major studies of long-term neurobehavioral effects of methadone on exposed infants revealed no methadone-associated adverse effects (Kaltenbach and Finnegan, 1984).

A review of the literature on methadone and lactation reveals that the amount of methadone in breast milk is very small and depends on the dose of methadone that a mother is receiving. The amount of methadone received by an infant from breast milk is not enough to prevent neonatal abstinence syndrome. Therefore, even though a mother is receiving methadone, her infant may require additional opiate treatment of neonatal abstinence syndrome (Jansson, Velez, and Harrow, 2004).

Methadone Safety for Pregnant Women and Their Infants—Figure 24 outlines key points discussed in the research citations above regarding the safety of methadone maintenance treatment for pregnant women.

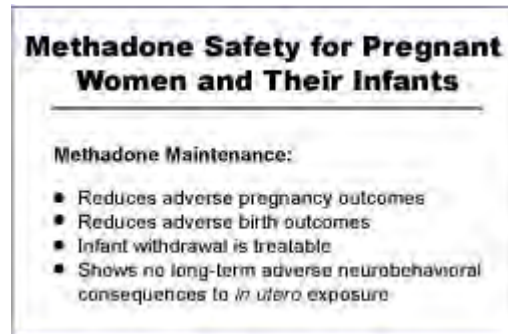


Figure 24 illustrates the safety of methadone maintenance treatment for pregnant women and their infants.

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Question 11: Is it necessary to reduce methadone dose or detoxify women from methadone during pregnancy to protect the fetus?

Answer: No. Women have been safely maintained on stable methadone dosage during pregnancy without adverse long-term effects on their health and the health of their infants. Withdrawal of medication during pregnancy leads to opioid abstinence syndrome, which is harmful to the pregnancy and often leads to relapse to illicit drug use. Dosage change in pregnancy must be carefully evaluated on an individual basis. Some women experience lowered blood levels of the methadone during pregnancy and may need an increase in dosage or split (e.g., twice daily) dosing. It is important to determine the relapse risk for each woman when considering a dosage change because a woman steadily maintained on methadone is more likely to have a healthy pregnancy and infant than a woman who uses alcohol and other drugs. The intermittent periods of withdrawal that typically occur with illicit opioid use and can adversely affect the fetus do not occur when methadone is individually determined and properly administered.

Research Highlights

- Optimal methadone dosage for pregnant women in methadone maintenance treatment should be based on careful consideration of risks and benefits to both mother and fetus on an individual basis. Individual dose should be evaluated, taking into account the stage of pregnancy, the relapse risk potential of the mother, pre-pregnancy methadone dose, previous experience with methadone, and history of addiction recovery. When the mother does not relapse to illicit drug use, short-term reductions in maternal dose have been effectively administered during the last stage of pregnancy. However, many women in treatment have been successfully maintained on a constant dose and, in some cases, on an increased dose to keep blood levels stable throughout pregnancy (Finnegan, 1991).
- Some women in treatment experience decreased blood levels of methadone during pregnancy, causing withdrawal symptoms. This decrease in blood levels of methadone during pregnancy can be accounted for by an increased fluid space, a large tissue reservoir that can store methadone, and drug metabolism by both the placenta and the fetus. Pregnant women in treatment with low blood levels of methadone frequently experience a high level of discomfort, withdrawal symptoms, and drug craving and anxiety and may be at high risk of relapse to opioid use and treatment dropout. Determination of methadone blood levels and possibly raising the methadone dosage to maintain sufficient blood levels may be warranted in such cases but must be carefully evaluated. Dosages should be evaluated in conjunction with ongoing medical monitoring of the pregnancy. Since the greatest risks to maternal and infant health occur when women in treatment relapse to illicit drug use, it is important to promote methadone dosage stability during and after pregnancy to optimize both maternal and child health (Kreek, Schecter, Gutjahr, et al., 1974; Pond, Kreek, Tong, et al., 1985).

Methadone Dosage Adjustment During Pregnancy—Figure 25 outlines the three main considerations regarding dosage for pregnant women in methadone maintenance treatment.

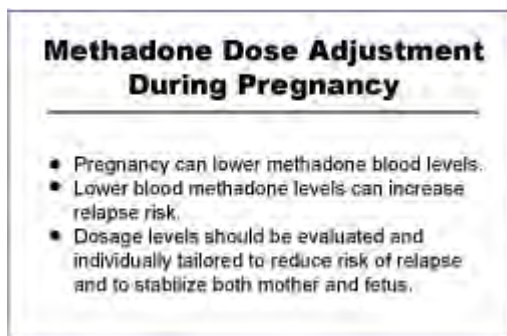


Figure 25 illustrates three main considerations regarding methadone dosage adjustment during pregnancy.

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Question 12: Is the long-term use of methadone medically safe, and is it well tolerated by patients?

Answer: Yes. Studies of the long-term administration of methadone confirm that it is a medically safe drug. Long-term methadone maintenance treatment at doses of 80 to 120 mg per day is not toxic or dangerous to any organ system after continuous treatment for 10 to 14 years in adults and 5 to 7 years in adolescents.

Research Highlights

- Methadone has few adverse biological effects. There appear to be no dangerous or troubling psychological effects from long-term administration (Kreek, 1979; Lowinson, Marion, Joseph, et al., 1992), although one study demonstrated a delay in neuropsychological tests in patients receiving methadone compared with abstinent (not active) former heroin-dependent patients (Verdejo, Toribio, Orozco, et al., 2005).
- Methadone sometimes causes minor side effects, such as sweating, constipation, temporary skin rashes, weight gain, water retention, and changes in sleep and appetite (Jaffe and Martin, 1985; Kreek, 1979). These side effects are more likely to occur when the methadone dosages are first being established in a patient, and the side effects generally subside or diminish over time. They can be reduced or eliminated by raising or lowering the methadone dose (Lowinson et al., 1992).
- Methadone prescribed in high doses for a long period of time has no toxic effects and only minimal side effects for adult patients maintained in treatment for up to 14 years and for adolescent patients treated for up to 5 years (Hartel, 1989/1990; Kreek, 1978).
- Although early studies demonstrated no persisting abnormalities directly attributable to methadone in the functioning of five organ systems (pulmonary, cardiovascular, renal, ophthalmologic, and liver) (Kleber, Mezritz, and Slobetz, 1980), later reports have focused on the potential effect of methadone on QTc interval (Martell, Arnsten, Krantz, et al., 2005) and central sleep apnea (Wang, Teichtahl, Drummer, et al., 2005). It should be noted, however, that cardiac complications with methadone are more commonly seen in patients who are prescribed very high doses (mean doses greater than 350 mg per day) for treatment of pain and those who are receiving concomitant medications that affect methadone metabolism (Krantz, Lewkowicz, Hays, et al., 2002).
- Patients maintained on methadone have no impairment in driving and have no more frequent motor vehicle accidents than people not receiving methadone maintenance treatment (Maddux, Williams, and Ziegler, 1977; Lenne, Dietze, Rumbold, et al., 2003; Schindler, Ortner, Peternell, et al., 2004).
- The most common and enduring complaints after 6 months to 3 years of continuous methadone treatment are sweating, constipation, abnormalities in libido and sexual functioning, sleep abnormalities (insomnia and nightmares), and altered appetite (mild anorexia, weight gain) (Kreek, 1979; Jaffe and Martin, 1985). Most of these symptoms can be medically managed (Kreek, 1979). A study of 92 methadone-maintained patients found that the rate of global sexual dysfunction in methadone-treated men was similar to the general population but that orgasm dysfunction may respond to methadone dose reduction.
- Although euphoria and drowsiness, with occasional nausea and vomiting, can occur before tolerance develops, these side effects are most noticeable when doses are increased too rapidly. Conversely, if a heroin habit has been particularly heavy, initial methadone doses may be too low to prevent the onset of early withdrawal symptoms (Kreek, 1979).

- Life-threatening interactions of methadone with other drugs have not been identified. Drugs found to affect the metabolism of methadone include phenytoin (Dilantin) and rifampin. Opioid antagonists such as pentazocine (Talwin) and buprenorphine can cause withdrawal symptoms in methadone patients and should not be prescribed (Kreek, 1978).

Common Side Effects After 6 Months to 3 Years of Methadone Maintenance Treatment		
Symptoms and Signs	Intermediate Length Treatment (6 Months or More; <40 to >80 mg/d)	Long-Term, High-Dose Treatment (3 Years or More; 80 to 120 mg/d)
	Percent	Percent
Increased Sweating	47	46
Constipation	57	17
Libido Abnormalities	26	22
Orgasm Abnormalities	—	14
Sleep Abnormalities (Insomnia)	23	16
Appetite Abnormalities	19	4
Nausea	25	—
Drowsiness	23	—
Nervousness/Tension	21	—
Headaches	12	—
Body Aches and Pains	11	—
Chills	10	—
— = no data available		

Figure 26 illustrates that methadone maintenance patients, in the early stages of treatment, can experience several minor side effects: sweating, constipation, orgasm abnormalities, alterations of sexual interest, alterations of sleep and appetite, nausea, drowsiness, nervousness, headaches, body aches and pains, and chills. However, the figure also shows that many of these side effects almost disappear with long-term, high-dose methadone maintenance treatment (Kreek, 1979; Jaffe and Martin, 1985; Hartel, 1989/1990).

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Question 13: Are there program characteristics associated with the success of methadone maintenance treatment?

Answer: Yes. There are several program characteristics associated with a variety of improved treatment outcomes in patients receiving methadone maintenance. These program characteristics are as follows:

- Establishment of evidence-based dosing policies and dose ranges
- Availability of a variety of psychosocial services for those who require them
- Attention to staff training and quality
- When possible, integration of medical, counseling, and administrative services

Research Highlights

- A meta-analysis of 12 trials involving 981 people comparing varying levels of psychosocial treatment added to methadone maintenance showed additional benefit in adding any psychosocial treatment to standard methadone maintenance treatment in relation to the use of heroin during the treatment; relative risk was 0.69 (95% CI 0.53 to 0.91). However, no statistically significant additional benefit was shown in terms of retention in treatment—relative risk was 0.94 (95% CI 0.85 to 1.02)—or proportion of patients retained or abstinent at followup—relative risk was 0.90 (95% CI 0.76 to 1.07) (Amato, Minozzi, Davoli, et al., 2004).
- Ball and Ross (1991) noted wide differences among the six methadone maintenance clinics studied with respect to the reduction of injection drug use by patients. Factors that account for treatment success include (1) adequate dosing; (2) participation in programs that had high retention rates, high rates of scheduled attendance, low treatment staff turnover, and a close, consistent, and enduring relationship between staff and patients; (3) an effective treatment director; (4) combined medical, counseling, and administrative services; (5) experienced counselors providing comprehensive counseling services; and (6) staff/patient agreement about the status of patients and their treatment needs.
- In a United Kingdom study of 262 patients who were admitted to and retained in methadone treatment programs at 6 months, structural equation models were used to evaluate relationships between treatment process variables and heroin use at 1 and 6 months. Patients' perceptions of program characteristics and methadone dose were related to reduced heroin use at 1 month. In addition, early engagement with treatment services was associated with decreased heroin use at 6 months (Gossop, Stewart, and Marsden, 2003).
- Studies comparing methadone treatment in general practice or primary care with treatment in specialty treatment clinics are limited, but at least two have demonstrated similar treatment outcomes between these two locations of care (Gossop, Marsden, Stewart, et al., 1999; Fiellin, O'Connor, Chawarski, et al., 2001).
- The Treatment Outcome Perspective Study (TOPS) examined a sample of 606 methadone maintenance treatment patients from 21 different clinics to identify treatment process factors related to improved patient retention rates. Results showed higher patient retention rates for programs (1) using organized and professional staff to diagnose problems and define treatment plans, (2) meeting and satisfying the needs perceived as important by clients, and (3) using higher methadone doses (Joe, Simpson, and Hubbard, 1991).
- A 6- to 7-year followup study of 347 methadone maintenance treatment patients examined different retention policies. Two programs had a high-dose, long-retention policy in which involuntary termination was used as a last resort. A third program had a low-dose, 2-year retention policy with strict terminations for program violations. Retention rates were longer in the two less structured programs (means of 4.3 and 3.2 years) than in the more structured program (mean of 2.2 years) (McGlothlin and Anglin, 1981).

- One study randomly assigned 69 patients at admission to structured and unstructured treatment groups. Structured groups had limits on illicit drug use that, if exceeded, resulted in withdrawal from methadone. The unstructured groups had no limits on illicit drug use. At the end of 1 year, 53 percent of the patients in structured groups remained in treatment, but only 30 percent of the patients in unstructured groups remained in treatment (McCarthy and Borders, 1985).
- A nationwide U.S. telephone survey of a randomized and stratified representative sample of 172 outpatient methadone units found that relatively high methadone dosage levels and patient participation in dosage decisions are related to higher retention rates (D'Aunno and Vaughn, 1992).
- According to Kreek (1991), adequate staff numbers, training, and concern for patient needs and high staff stability (low staff turnover) are associated with improved patient outcomes (Center for Substance Abuse Treatment, 1993).

The Effects of Dosage on Methadone Maintenance Treatment—Research regarding methadone dosage levels clearly establishes that low average doses are inappropriate in methadone maintenance treatment. No single level is effective for all patients, although NIDA-supported research has suggested that the minimum effective dosage for most methadone maintenance patients is 60 mg per day. The specific dosage for a patient cannot be determined arbitrarily because patients metabolize methadone at different rates. In addition, the appropriate dosage can change over time or in response to specific situations such as pregnancy or the use of other medications. Overall, methadone dosage should be based on the patient's individual needs, goals of treatment, and progress in treatment.

In the Ball and Ross studies (1991), illicit opioid use was directly related to methadone dosage levels. In methadone maintenance patients on dosages of about 71 mg per day, no heroin use was detected, but methadone maintenance patients on dosages below 46 mg were 5.16 times more likely to use heroin than those on higher dosages.

Ball and colleagues (1988) found that 18.6 percent of 490 patients who were in methadone maintenance treatment for 6 months to 4.5 years used heroin within the last 30 days, but use correlated strongly with methadone dosage level. At doses of 75 mg per day and above, the continuing use of heroin stopped altogether. In contrast, 64 percent of patients maintained on 10 mg per day or less continued frequent heroin use. A dose of 40 mg per day seemed to be the cutoff point for a large decrease in heroin use.

Despite recent attention to the importance of adequate methadone dosages, a large-scale survey of methadone maintenance treatment programs conducted in the United States in 1992 found that 50 percent of patients nationwide receive suboptimum methadone doses (D'Aunno and Vaughn, 1992). A subsequent evaluation found that the percentage of patients receiving methadone doses less than 60 mg per day has decreased from 79.5 percent in 1988 to 35.5 percent in 2000. Programs with a greater percentage of African American patients were more likely to dispense low doses of methadone, and programs with Joint Commission on Accreditation of Healthcare Organizations accreditation were more likely to provide adequate methadone doses (D'Aunno and Pollack, 2002).

In an exhaustive review of 22 studies that compared the effects of different methadone dosages on outcomes such as patient retention, continuing illicit opioid use, and symptoms, Hargreaves (1983) concluded that daily methadone doses of 100 mg were superior to those of 50 mg during the first 5 to 10 months of methadone maintenance treatment for a sizeable subgroup (10 percent to 30 percent) of opioid addicts.

In a study of 2,400 patients enrolled in methadone maintenance over a 15-year period, those patients maintained on a daily dose of 60 mg or more had longer retention in treatment; less use of heroin and

other drugs, including cocaine; and a lower incidence of HIV infection and AIDS (Hartel, Selwyn, and Schoenbaum, 1988a and 1988b).

In a multiclinic study of 12 Veterans Administration hospitals, methadone maintenance treatment patients were assigned to two dosage levels of methadone: 50 mg and 100 mg. The percentage of patients retained for 10 months was higher in the 100-mg group (52 percent) than in the 50-mg group (42 percent), but the difference was not statistically significant (Ling, Charuvastra, Kaim, et al., 1976).

Studies that examined the relationship between methadone maintenance treatment dosage and retention suggest that, although many patients will continue in treatment on methadone doses of less than 50 mg, some patients need higher doses. In a review of five well-designed dose-retention studies, three found statistically nonsignificant trends toward increased retention with higher doses and two did not (Maddux, Vogtsberger, Desmond, et al., 1993).

In a study of 180 methadone maintenance treatment patients randomly assigned at admission to three groups that received doses of 30 mg, 50 mg, and 100 mg, the percentages retained for 53 weeks were as follows: 45 percent of the 30-mg group, 55 percent of the 50-mg group, and 35 percent of the 100-mg group. The 100-mg group had the lowest retention rate, but the differences were not statistically significant (Garbutt and Goldstein, 1972).

A study of 322 methadone maintenance treatment patients receiving an average daily dose of 30 mg demonstrated a high dropout rate. Only 17 percent of the sample remained in treatment at the end of 6 months, and only 10 percent remained by the end of a year. Moreover, patients who dropped out within the first 30 days had the same drug-using behavior as they did before treatment (Craig, 1980).

Methadone dose should not be rapidly increased or decreased—or used in contingency management—because such changes tend to disrupt the normalization of physiological function achieved by steady dose treatment. If the stabilized methadone dose/plasma levels are disrupted, drug hunger and drug-seeking behaviors are likely to reappear (Kreek, 1991; Kreek, 1992).

Need for Comprehensive Services in Methadone Maintenance Treatment—In a study of 351 daily or weekly heroin users who were admitted to 1 of 17 publicly funded methadone maintenance treatment programs, nearly all (85 percent) reported having difficulty in at least one of the following problem areas: medical or physical; mental health or emotional; family or friends; police or legal; job, work, or school; and financial or money. Nearly one-half (44 percent) reported having difficulties in more than three of these areas (Condelli, 1993).

Program Characteristics Associated With Success of Methadone Maintenance Treatment—Other program characteristics that appear to improve treatment success include having sufficient staff, low staff turnover and high staff stability, sufficient staff training, and close and enduring relationships between staff and patients.



Figure 27 illustrates the program characteristics, identified by numerous research studies, that contribute to methadone maintenance treatment success (McLellan, Arndt, Metzger, et al., 1993; Ball and Ross, 1991; Joe et al., 1991).

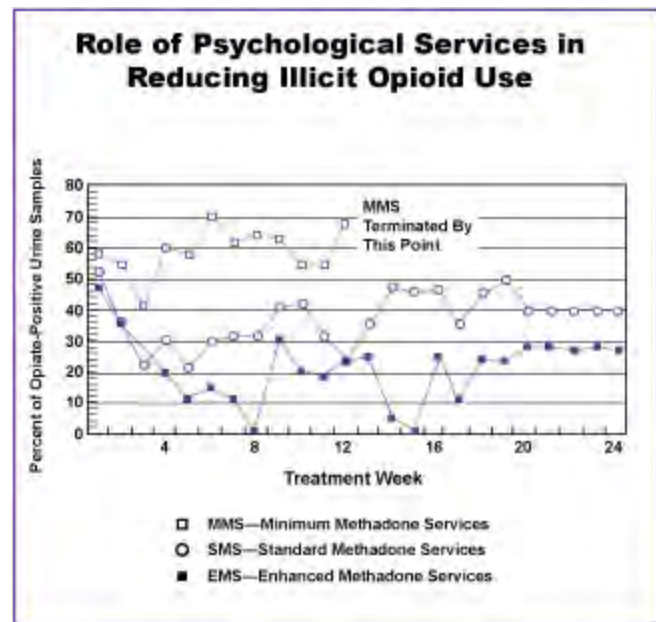


Figure 28 illustrates that in a recent study, 102 patients were divided into three groups: (1) minimum methadone maintenance treatment services (methadone alone); (2) standard methadone maintenance treatment services (methadone plus counseling); and (3) enhanced methadone maintenance treatment services (methadone, counseling, and onsite medical, psychiatric, employment, and family therapy services). At 24 weeks, methadone alone resulted in minimal improvements; methadone plus counseling resulted in significant improvements over methadone alone; and enhanced Services, including a broad range of psychosocial services plus methadone, had the best outcomes of all (McLellan et al., 1993). Patients receiving the most comprehensive array of treatment services were the most likely to have opioid-free urine tests for the 24 weeks of the study. Patients receiving minimal services were the most likely to have urine tests that were positive for illicit opioids. Note: These patients were removed from participation in the study because of drug use and psychiatric difficulties. Additional treatment services were made available.

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Question 14: Are there patient characteristics associated with the success of methadone maintenance treatment?

Answer: Yes. Patient characteristics associated with treatment success include the following:

- Age
- Age of first heroin use
- Overall drug-use history
- Severity and duration of drug use
- Emotional health
- Psychiatric health
- Social health
- Vocational stability
- Criminal history

Research Highlights

One review found the following characteristics to be associated with improved methadone outcomes: older age, absence of criminal behavior, shorter duration of opioid use, less severe psychopathology, being employed, being married, less polysubstance use, and higher expressed desire in getting help with a drug problem (Ward, Mattick, Hall, et al., 1998).

- In a review of 113 studies that attempted to evaluate the relationship of patient characteristics to retention and other outcomes (reported from 1971 to 1983), it was noted that patient characteristics probably accounted for only 25 to 45 percent of the variance in retention (McLellan, 1983).
- For methadone maintenance treatment patients in the Drug Abuse Reporting Program (DARP) studies, the most important predictors of posttreatment outcomes were (1) preadmission criminality and (2) measurements of crime, drug use, and employment during treatment. Of all the patient characteristics, chronic criminality is the strongest predictor of unfavorable posttreatment outcomes (Simpson and Sells, 1982).
- Ball and Ross's work (1991) supports the finding that a younger age at the onset of heroin use is associated with poorer treatment outcomes. Overall, however, this study noted that patient characteristics had less impact on outcomes than program variables.
- Anglin and Hser (1990) note that better psychosocial adjustment predicts superior treatment outcomes. Psychosocial adjustment was described as an intact marriage, a job, a shorter history of drug abuse, lower levels of psychiatric dysfunction, and minimal or no criminal history.
- Rounsaville, Glazer, Wilber, et al. (1983) assessed 123 opioid addicts who were followed for 6 months after admission and found that outcome was predicted by the behavior examined: greater pretreatment criminality predicts criminal activity following discharge. Conversely, pretreatment employment predicts posttreatment employment. This study found that patients who abuse alcohol, are unemployed, are dually diagnosed, manifest psychopathology, and engage in criminality have poor outcomes.



Figure 29 illustrates that, overall, patients who demonstrate emotional, psychological, and social well-being generally experience greater treatment success than patients who have emotional, psychological, and social problems. Several studies have noted that certain patient characteristics, which are listed in Figure 29, are associated with success in methadone maintenance treatment (McLellan, 1983; Simpson and Sells, 1982; Ball and Ross, 1991; Anglin and Hser, 1990).

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Question 15: Are there cost benefits to methadone maintenance treatment?

Answer: Yes. Research has demonstrated that methadone maintenance treatment is beneficial to society, cost-effective, and pays for itself in basic economic terms.

Research Highlights

A cost-effectiveness analysis reviewed five policy questions from an economic perspective: (1) whether methadone should be a healthcare benefit; (2) what level of ancillary services is optimal; (3) what methadone dose is appropriate; (4) what length of treatment is appropriate; and (5) whether contingency contracts should be employed. The analysis found that expanded access to methadone maintenance had an incremental cost-effectiveness ratio of less than \$11,000 per quality-adjusted life year (QALY). Ancillary services were shown to be an effective part of methadone maintenance therapy, especially during the beginning of a treatment episode. The cost of additional methadone was found to be low compared with the benefits of adequate doses. Short episodes of methadone maintenance were felt not likely to be cost-effective (Barnett and Hui, 2000).

A unique and timely analysis was performed that focused on the cost-effectiveness of methadone treatment based on its impact on the HIV epidemic. The analysis considered populations in which HIV prevalence among injection drug users ranged from 5 percent to 40 percent. The results demonstrated that increased methadone maintenance capacity costs \$8,200 per QALY gained in high-prevalence communities and \$10,900 per QALY gained in low-prevalence communities. Interestingly, the majority of benefits were gained by individuals who do not inject drugs (Zaric, Barnett, and Brandeau, 2000).

- A standard cost-effectiveness evaluation of methadone considered the incremental effect of methadone on the lifespan and treatment cost of a cohort of 25-year-old heroin users. The results demonstrated that providing opioid-dependent patients with methadone maintenance had an incremental cost-effectiveness ratio of \$5,915 per life-year gained. A sensitivity analysis determined that the ratio was less than \$10,000 per life-year over a range of assumptions. This cost-effectiveness ratio was lower than that of many common medical therapies and well within the \$50,000 threshold typically used in developed countries for judging cost-effectiveness (Barnett, 1999).
- A systematic review from Lithuania on studies of the cost-effectiveness of methadone noted that methadone maintenance had higher economic efficiency with daily doses of 80 to 100 mg, and daily doses lower than 40 mg were considered inefficient. In addition, short treatment episodes were not likely to be cost-effective, and ancillary services were more cost-effective at the beginning of methadone maintenance than in the later stages. Economic efficiency was found to be higher as treatment program census increased as opposed to the provision of more ancillary services (Vanagas, Padaiga, and Subata, 2004).
- The most comprehensive examination of economic benefits and costs was performed on data from the Treatment Outcome Perspective Study (TOPS). After examining the average cost of a methadone maintenance treatment day, detailed measurements of criminal activities rates, and the cost to society of various crimes, the study yielded a final benefit-to-cost ratio of 4 to 1 (Harwood, Hubbard, Collins, et al., 1988).
- Rufener, Rachal, and Cruz (1977) studied the cost-effectiveness of methadone maintenance (and other treatment modalities) and determined a benefit-to-cost ratio of 4.4 to 1.
- McGlothlin and Anglin (1981), using data from low-dose programs, compared patients who left methadone maintenance treatment when a community clinic was closed in Bakersfield, California, with patients in another community's program that remained open. For men, the ratio of crime-related economic benefits to treatment costs was 1.7 to 1 over a 2-year period. In

addition, the continuous treatment group reported significantly higher rates of employment than those who had been closed out of treatment, although the factor was not formally assessed in the study.

- Methadone maintenance treatment, when implemented at sufficient resource levels, provides individual and social benefits for at least several years that are substantially higher than the cost of delivering this treatment. The daily benefits equal the daily costs in virtually every case, even among those who continue drug use at a reduced level (Gerstein and Harwood, 1990).
- There are many more costs to society associated with active heroin use (Rufener et al., 1977). These include medical costs, law enforcement costs, judicial system costs, corrections costs, nondrug crime costs, drug traffic control, drug abuse prevention costs, reducing housing stock costs, absenteeism costs, unemployment costs, and drug-related deaths. Thus, when all costs to society are considered, methadone maintenance treatment is extremely cost-effective and beneficial to society.
- A study that randomly assigned new patients to three levels of care (methadone alone, methadone plus standard counseling services, and methadone plus enhanced services [counseling, medical/psychiatric, employment, and family therapy services]) found that methadone plus standard counseling was most cost-effective. At 12 months, the annual cost per abstinent client was \$16,485, \$9,804, and \$11,818 for the low, intermediate, and high levels of counseling, respectively (Kraft, Rothbard, Hadley, et al., 1997). A similar finding was obtained in a cost-effectiveness study of varying levels of care provided along with methadone maintenance in Spain (Puigdollers, Cots, Brugal, et al., 2003).
- In a study comparing ongoing methadone maintenance with 6 months of methadone maintenance followed by detoxification, total healthcare costs were greater for maintenance than detoxification treatment (\$7,564 vs. \$6,687; $p < 0.001$). However, detoxification patients incurred significantly higher costs for substance abuse and mental healthcare services. Methadone maintenance appeared to provide a small survival advantage compared with detoxification. The cost per life-year gained was \$16,967. Sensitivity analysis revealed a cost-effectiveness ratio of less than \$20,000 per QALY over a range of modeling assumptions (Masson, Barnett, Sees, et al., 2004).

Comparison of Treatment and Societal Costs of Active Heroin Addiction—A study of the cost benefits of methadone maintenance treatment showed that the costs to society of the criminal activities related to active heroin use can run as high as four times more than the costs for methadone maintenance treatment (Harwood et al., 1988).

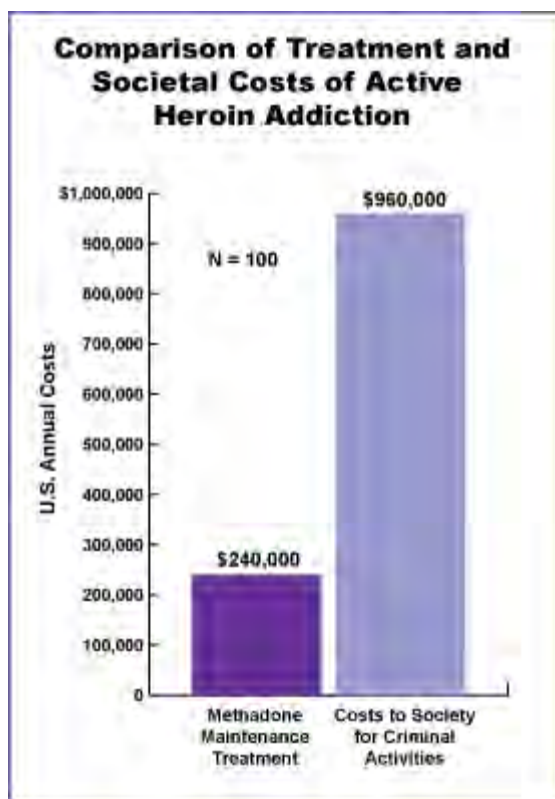


Figure 30 illustrates the cost-benefit relationship. For example, if the approximate annual cost for providing methadone maintenance treatment is \$2,400 per person, it would cost about \$240,000 to provide treatment for 100 patients for 1 year. In contrast, the annual costs to society related to the criminal activities of 100 active heroin addicts not in treatment would exceed \$960,000 (Harwood et al., 1988).

Through the New York State Department of Substance Abuse Services, NIDA researchers have estimated the yearly cost to maintain an opioid addict in New York: untreated and on the street (\$43,000), in prison (\$34,000), in a residential drug-free program (\$11,000), and in methadone maintenance treatment (\$2,400) (New York State Committee of Methadone Program Administrators, 1991).

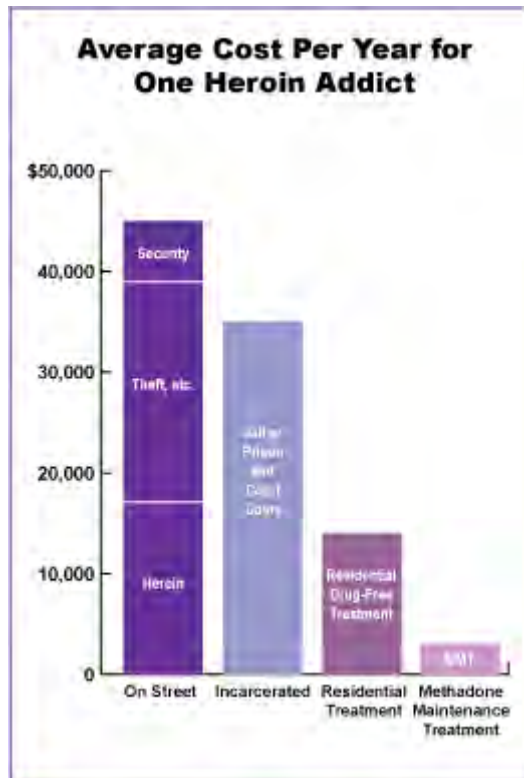


Figure 31 illustrates the cost of active heroin use for one addict for a year at about \$43,000 in 1991. This includes the cost of the heroin, the loss of property related to theft and burglary, and the costs of security measures to combat such crimes.

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Question 16: What are the retention rates for methadone maintenance treatment?

Answer: Retention in methadone is related to the dose of methadone but not the provision of ancillary services.

Research Highlights

- A meta-analysis of studies comparing the provision of methadone maintenance with and without ancillary services demonstrated decreased illicit heroin use with ancillary services but found no statistically significant additional benefit in terms of retention in treatment, RR 0.94 (95% CI, 0.85 to 1.02) (Amato, Davoli, Perucci, et al., 2005).
- An observational study of 351 patients in the United Kingdom receiving methadone maintenance compared with those receiving methadone dose reduction found the following retention rates: 88 percent vs. 86 percent at 1 month, 71 percent vs. 58 percent at 2 months, 62 percent vs. 50 percent at 1 year, and 42 percent vs. 30 percent at 2 years (Gossop, Marsden, Stewart, et al., 2001).
- An Italian study followed 1,503 heroin-dependent patients who received treatment in the form of methadone maintenance, a drug-free program, or naltrexone. The retention rate after 1 year was 40 percent for patients in methadone maintenance, 18 percent in naltrexone, and 15 percent in the drug-free program. Patients receiving methadone greater than or equal to 60 mg per day and 30 to 59 mg per day were respectively 70 and 50 percent more likely to remain in treatment than those receiving less than 30 mg per day. Patients receiving methadone maintenance were 30 percent more likely to remain in treatment than those not receiving methadone (D'Ippoliti, Davoli, Perucci, et al., 1998).
- Thirty-eight percent of the new patient group (total 126) in the Ball and Ross (1991) studies of six methadone maintenance treatment programs remained in treatment after a year; 63 percent of the moderate-stay group (total 345) were still in treatment a year later; and 84 percent of the long-term patients (total 146) continued their methadone maintenance treatment for another year.
- In a study of 311 admissions to three methadone maintenance treatment programs during 1990 and 1991, 24 percent dropped out within 60 days. The significant predictors of retention were social stability (being married, employed, and having few prior arrests); previous treatment experience; high dosage levels; and motivation for treatment (Simpson and Joe, 1993).

Additional Studies

- In a study of 351 daily or weekly heroin users who were admitted to 1 of 17 publicly funded methadone treatment programs, predictors of retention in methadone maintenance treatment programs included (1) positive patient evaluations of the quality of social services received during the first month after admission (e.g., family, legal, educational, employment, financial services); (2) positive patient ratings of how easily accessible the program was; and (3) participation in programs that informed patients of their methadone dosage levels (Condelli, 1993).

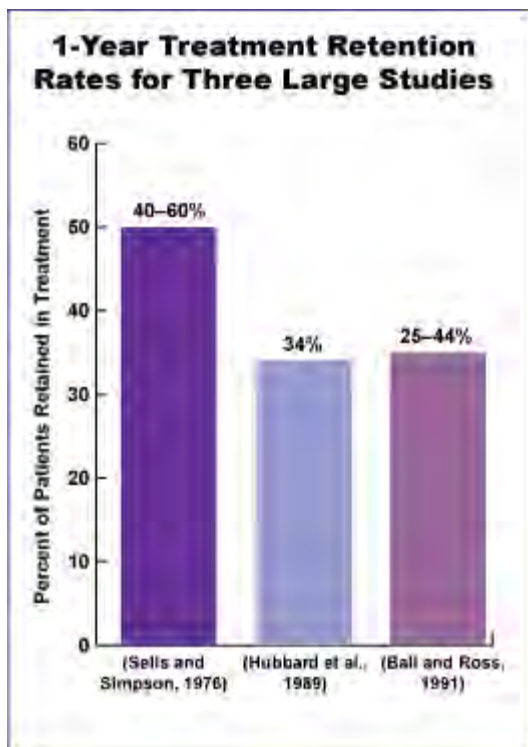


Figure 32 illustrates 1-year treatment retention rates for three large studies.

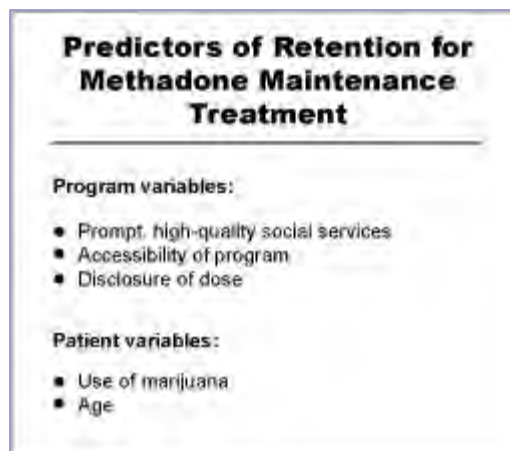


Figure 33 illustrates that in the Treatment Outcome Perspective Study (TOPS), patient self-report ratings of the quality (not the number) of social services received during the first month of methadone maintenance treatment were a strong predictor of retention (Condelli and Duntzman, 1993). The study suggests that methadone maintenance treatment programs should provide patients with high-quality social services as soon as possible after admission in order to promote retention. The study found that three program and two patient variables predicted retention. It also noted that patients who were 25 years of age or younger were more likely than older patients to drop out of methadone maintenance treatment programs, possibly because they lacked the motivation, maturity, and life goals that often characterize older patients.

Likelihood of Relapse After Leaving Methadone Treatment—Of 105 patients who were followed in the community after leaving methadone maintenance treatment after 1 month to 1 year or longer, two-thirds (67.6 percent) relapsed to injection drug use (Ball and Ross, 1991).

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Question 17: Is mandated methadone maintenance treatment as effective as voluntary treatment?

Answer: Yes. Mandated methadone maintenance treatment (being forced to attend treatment by the criminal justice system) is as effective as voluntary treatment.

Research Highlights

A study examined the relationship between length of stay in methadone maintenance treatment and referral by legal and nonlegal sources of 2,200 patients. It was determined that patients who are legally referred to methadone maintenance treatment stay in treatment longer than, and do at least as well as, those who seek treatment voluntarily (Collins and Allison, 1983).

A study of 121 male veterans in a 90-day Veterans Administration drug rehabilitation program compared court-referred and voluntary patients. Objective and subjective measures both indicate that the court-referred patient is potentially as responsive to methadone maintenance treatment as the voluntary patient. Sixty-two percent of the court-referred patients were judged to have a good prognosis compared with 58 percent of the voluntary patients (McLellan and Druley, 1977).

Three samples of methadone maintenance treatment admissions, who were treated during the years of 1971 to 1973, participated in a followup study 7 years later. These groups included (1) a random sample of 100 patients, (2) a sample of 136 patients who had a minimum of 30 months remaining on civil addict parole status at the time of admission, and (3) a matched sample of 136 patients not on parole. The addition of parole supervision with urine testing resulted in only marginal improvements in behavior over that attributable to methadone maintenance treatment alone; however, parole status did significantly reduce the length of intervals of daily heroin use both before and after admission (Anglin, McGlothlin, and Speckart, 1981).

Mandated Methadone Maintenance Treatment and Three Treatment Outcomes—Patients who are legally coerced into methadone maintenance treatment experience treatment success at about the same rate as patients who participate voluntarily in treatment.

A study by Anglin, Brecht, and Maddahian (1990) examined patients who were mandated to treatment and those who entered voluntarily. One group was forced to participate in methadone maintenance treatment (high coercion). A second group (not represented in Figures 34 through 36) had moderate legal pressure to participate in methadone maintenance treatment (medium coercion). A third group had mild legal pressure to participate in methadone maintenance treatment (low coercion).

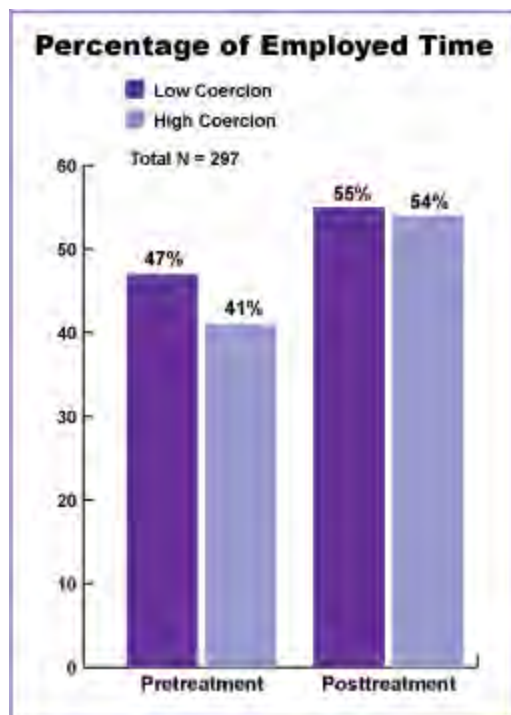


Figure 34 compares the behaviors of individuals in the high-coercion group with those of individuals in the low-coercion group for the treatment outcome of time employed. As the figure illustrates, patients who are coerced in treatment achieve this treatment outcome at about the same rate as patients who voluntarily participate in methadone maintenance treatment (Anglin et al., 1990).

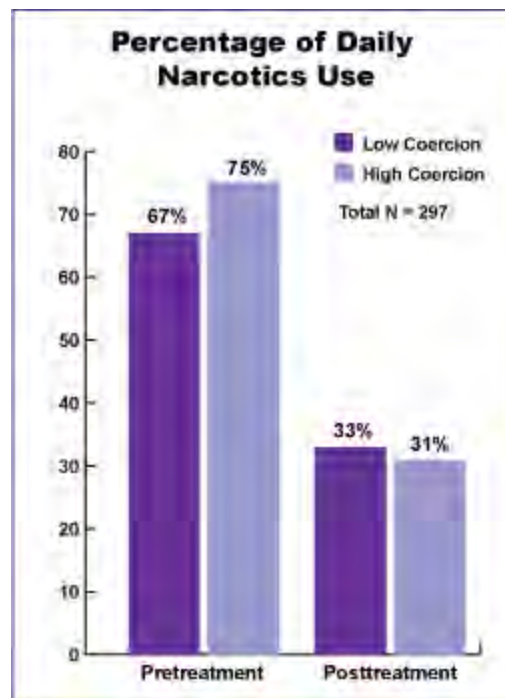


Figure 35 compares the behaviors of individuals in the high-coercion group with those of individuals in the low-coercion group for the treatment outcome of daily narcotics use. As the figure illustrates, patients who are coerced in treatment achieve this treatment outcome at about the same rate as patients who voluntarily participate in methadone maintenance treatment (Anglin et al., 1990).

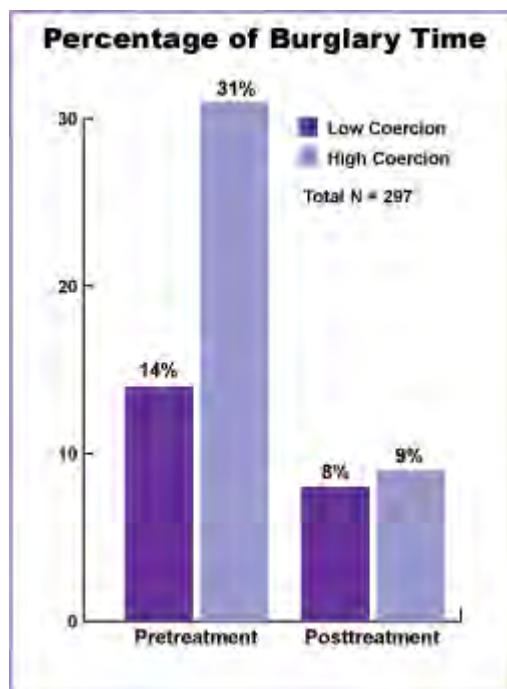


Figure 36 compares the behaviors of individuals in the high-coercion group with those of individuals in the low-coercion group for the treatment outcome of criminal involvement. As the figure illustrates, patients who are coerced in treatment achieve this treatment outcome at about the same rate as patients who voluntarily participate in methadone maintenance treatment (Anglin et al., 1990).

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Question 18: What is the role of L-alpha-acetyl-methadol (LAAM)?

Answer: L-alpha-acetyl-methadol (LAAM), a potent opioid with a longer duration of action than methadone, can suppress opioid withdrawal for up to 72 hours. Research on both LAAM and methadone maintenance treatment provides comparable results regarding patients' reported clinic attendance, opioid withdrawal symptoms, illicit drug use, employment status, and criminal activity. Both treatments are similar regarding overall effectiveness.

Due to concerns over reports of QT interval prolongation and episodes of Torsades de Point, LAAM was removed from the European markets and subsequently had limited use in the United States.

Question 19: How do buprenorphine and methadone compare?

Answer: Buprenorphine is approved for use in the treatment of opioid dependence in a large number of countries, including Australia, Belgium, Canada, Croatia, Germany, Iran, England, France, the United Kingdom, and the United States. Buprenorphine is a partial agonist at the opioid receptor, as opposed to a full agonist such as methadone or heroin. This means that buprenorphine has a unique pharmacologic profile leading to a lower likelihood of overdose or respiratory depression. Like methadone, buprenorphine has the ability to suppress opioid craving and withdrawal, block the effects of self-administered opioids, retain patients in treatment, and decrease illicit opioid use. Because it is a partial agonist, buprenorphine maintains patients in a milder degree of physical dependence and is associated with milder withdrawal syndrome following cessation.

Clinical trials comparing the efficacy of buprenorphine to methadone on the outcomes of retention and illicit opioid use have demonstrated similar results when compared with low doses of methadone (20 to 30 mg) (Johnson, Jaffe, and Fudala, 1992; Ling, Wesson, Charuvastra, et al., 1996). Comparisons to higher doses (35 to 90 mg) of methadone have yielded mixed results (Strain, Stitzer, Liebson, et al., 1994; Kosten, Schottenfeld, Ziedonis, et al., 1993).

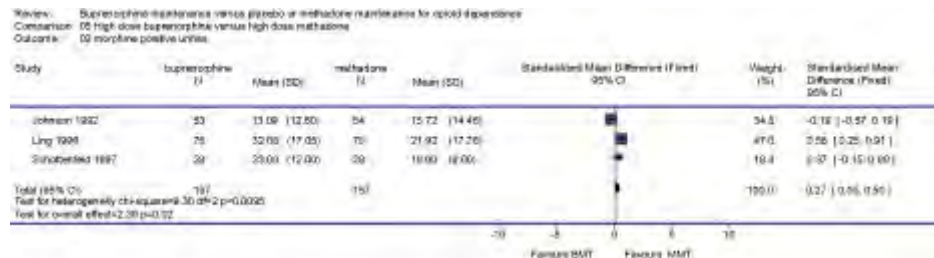


Figure 37a

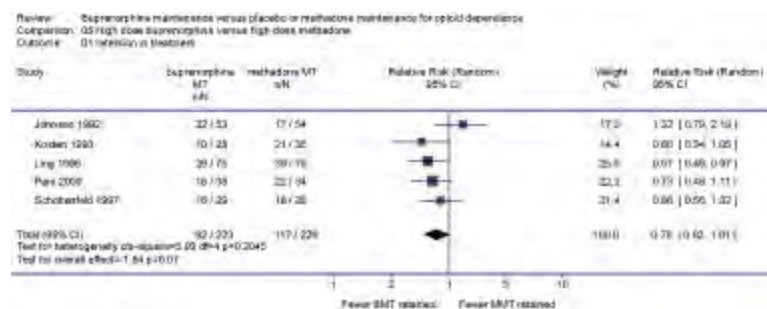


Figure 37b

Figures 37a and 37b illustrate that a meta-analysis of 13 clinical trials that compared buprenorphine maintenance with methadone maintenance had the following findings: “Buprenorphine given in flexible doses appeared statistically significantly less effective than methadone in retaining patients in treatment (RR = 0.82; 95% CI: 0.69-0.96). Low-dose buprenorphine is not superior to low-dose methadone. High-dose buprenorphine does not retain more patients than low-dose methadone, but may suppress heroin use better. There was no advantage for high-dose buprenorphine over high-dose methadone in retention (RR = 0.79; 95% CI: 0.62-1.01), and high-dose buprenorphine was inferior in suppression of heroin use. Buprenorphine was statistically significantly superior to placebo medication in retention of patients in treatment at low doses (RR = 1.24; 95% CI: 1.06-1.45), high doses (RR = 1.21; 95% CI: 1.02-1.44), and very high doses (RR = 1.52; 95% CI: 1.23-1.88). However, only high and very high dose buprenorphine suppressed heroin use significantly above placebo.” (Mattick, Kimber, Breen, et al., 2003.) (Please note, this review will be updated.)

Patients receiving buprenorphine can be either (1) discontinued without significant withdrawal, (2) maintained, or (3) transferred to opioid antagonist treatment, such as naltrexone. Patients with a higher level of physical dependence and whose needs cannot be met by buprenorphine can be transferred to an opioid agonist, such as methadone or L-alpha-acetyl-methadol (LAAM).

Research Highlights

- Mello and Mendelson showed that buprenorphine suppresses heroin self-administration by opioid-dependent primates and humans (Mello and Mendelson, 1980; Mello, Mendelson, and Kuehnle, 1982; Mello, Bree, and Mendelson, 1983).
- Findings from a subsequent dose-ranging study at the Los Angeles Addiction Treatment Research Center (LAATRC) suggest that the median doses of buprenorphine for adequate clinical stabilization may be in the 12- to 16-mg range (Compton, Ling, Charuvastra, et al., in press).
- A NIDA-sponsored, 12-site LAATRC/Veterans Administration/NIDA multicenter study compared doses of 1, 4, 8, and 16 mg of buprenorphine in 631 patients. The primary comparison between the 8-mg and the 1-mg groups shows that the 8-mg group used fewer illicit opioids and remained in treatment longer (Ling, Charuvastra, Collins, et al., 1998).

A clinical trial comparing buprenorphine, the buprenorphine/naloxone combination, and placebo was terminated early because buprenorphine and naloxone in combination and buprenorphine alone were found to have greater efficacy than placebo. Opioid-negative urine samples were found more frequently in the buprenorphine and buprenorphine/naloxone groups (17.8% and 20.7%, respectively) than in the placebo group (5.8%, $p < 0.001$ for both comparisons) (Fudala, Bridge, Herbert, et al., 2003).

Potential Benefits of Buprenorphine

Research on buprenorphine has shown that it has the potential to be a feasible alternative to methadone maintenance treatment. One potential benefit of buprenorphine compared with methadone that needs further investigation is a lower prevalence of medication interactions between buprenorphine and highly active antiretroviral treatment used to treat patients with HIV (Sullivan and Fiellin, 2005). Additional potential benefits of buprenorphine treatment are outlined in Figure 38.



Figure 38 illustrates the potential benefits of buprenorphine.

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Question 20: Can methadone and buprenorphine be abused?

Answer: Both methadone and buprenorphine can be diverted from their intended recipients. This diversion occurs in countries that provide these medications via supervised dispensing (e.g., pharmacies) and by prescription. Oftentimes, this diversion is by individuals who are seeking a therapeutic benefit (e.g., unobserved treatment). Other times, this diversion results in abuse. The extent of these two types of diversion varies, although most studies note that the benefits of providing the treatment outweigh the risks associated with diversion. For instance, the efficacy of methadone has been demonstrated over the past 40 years (O'Connor and Fiellin, 2000). The provision of methadone and buprenorphine treatment was associated with a 75-percent decrease in fatal heroin overdoses in France (Lepere, Gourarier, Sanchez, et al., 2001; Auriacombe, Fatseas, Dubernet, et al., 2004).

In studies that have compared death rates from heroin overdose among those who are untreated and those who receive methadone, deaths are higher among untreated opioid-dependent individuals (Caplehorn, Dalton, Haldar, et al., 1996; Zanis and Woody, 1998).

Research Highlights

Methadone Abuse

Methadone can be diverted for oral or intravenous use (Fiellin and Lintzeris, 2003; Green, James, Gilbert, et al., 2000). Some diverted methadone can result in fatal overdoses; however, the rate of overdose among patients enrolled in methadone maintenance is low. A meta-analysis revealed a relative risk of death of 0.25 (95% CI: 0.19-0.33) for patients receiving methadone maintenance (Caplehorn et al., 1996). A study of nearly 10,000 individuals inducted onto methadone determined that the mortality rate was 7.1 deaths per 10,000 inductions (95% CI: 1.8± 12.4). In this same study, 51 percent of methadone-related deaths occurred in people who were not registered in methadone maintenance (Zador and Sunjic, 2002).

In addition, while methadone may be detected in drug-related deaths, it is often not the causative agent. In one study in the west of Scotland, during the period 1991–2001, methadone alone was judged to be the causative agent in only 29 percent (56) of drug-related deaths (Seymour, Black, Jay, et al., 2003).

Similarly, with the increased use of methadone as a treatment for chronic pain, the majority of methadone-related deaths in Australia and the United States are believed to be associated with the use of this medication for pain treatment instead of treatment of opioid dependence (Williamson, Foreman, White, et al., 1997; Center for Substance Abuse Treatment, 2004).

Buprenorphine Abuse

As a partial agonist, buprenorphine has less potential for abuse than most full agonists. However, there is a reinforcing effect that subjects can experience with buprenorphine administration, especially via the injection route. This reinforcement is less likely if the subject has recently used a full agonist compound; in fact, buprenorphine can lead to a painful and uncomfortable precipitated withdrawal under this scenario. In addition, the development of a tablet that combines buprenorphine with naloxone, in a 4 to 1 ratio, has demonstrated decreased abuse potential and the ability to precipitate withdrawal in patients who are receiving a full opioid agonist (Mendelson, Jones, Welm, et al., 1999).

When the buprenorphine/naloxone combination tablet is taken sublingually, as prescribed, naloxone is poorly absorbed, and the patient receives a buprenorphine effect. However, if the tablet is dissolved and injected, the naloxone will antagonize the buprenorphine, resulting in a range of reactions, including blockade of opioid effects and precipitation of an immediate withdrawal. In this way, the combination gives the therapeutic benefit but greatly reduces opportunities for abuse by injection.

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Short Communication

The influence of distance on utilization of outpatient mental health aftercare following inpatient substance abuse treatment

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Abstract

This study examined whether substance abuse patients who live farther from their source of outpatient mental health care were less likely to obtain aftercare following an inpatient treatment episode. For those patients who did receive aftercare, distance was evaluated as a predictor of the volume of care received. A national sample of 33,952 veterans discharged from Department of Veterans Affairs (VA) inpatient substance abuse treatment programs was analyzed using a two-part choice model utilizing logistic and linear regression. Patients living farther from their source of outpatient mental health care were less likely to obtain aftercare following inpatient substance abuse treatment. Patients who traveled 10 miles or less were 2.6 times more likely to obtain aftercare than those who traveled more than 50 miles. Only 40% of patients who lived more than 25 miles from the nearest aftercare facility obtained any aftercare services. Patients who received aftercare services had fewer visits if they lived farther from their source of aftercare. Lack of geographic access (distance) is a barrier to outpatient mental health care following inpatient substance abuse treatment, and influences the volume of care

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received once the decision to obtain aftercare is made. Aftercare services must be geographically accessible to ensure satisfactory utilization.

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Keywords: Aftercare; Distance; Drug abuse; Geographical mobility; Outpatients; Veterans

1. Introduction

It is well established that utilization of outpatient mental health aftercare following episodes of acute inpatient substance abuse treatment results in better outcomes (Costello, 1980; Walker, Donovan, Kivlahan, & O'Leary, 1983). Active involvement in aftercare is also associated with reduced readmission rates (Moos & Moos, 1995; Peterson, Swindle, Phibbs, Recine, & Moos, 1994), even among patients with comorbid psychiatric disorders (Swindle, Phibbs, Paradise, Recine, & Moos, 1995).

Geographic access to care is an important determinant of health service use (Burgess & DeFiore, 1994; Mooney, Zwanziger, Phibbs, & Schmitt, 2000; White, 1986). Studies of hospital choice have shown consistently that increased distance reduces the probability that a hospital will be chosen by a patient for services (Holloway, Medendorp, & Bromberg, 1990; Luft et al., 1990; McGuirk & Porell, 1984). Because of the chronic nature of substance abuse disorders, proximity may be an especially important determinant of consistent outpatient treatment and, therefore, treatment success.

Although studies have evaluated the relationship between distance and utilization of certain types of outpatient care (Burgess & DeFiore, 1994; Fortney, Booth, Blow, & Bunn, 1995; Piette & Moos, 1996), we are aware of no studies that have specifically examined distance as a determinant of access to mental health aftercare for a broad range of substance abuse patients, or of the volume of services used.

The Department of Veterans Affairs (VA) provides a unique environment in which to study these issues. In fiscal year 1999 (FY99), VA medical centers (VAMCs) provided inpatient substance abuse treatment to 14,300 patients (Piette & Fong, 2000). In addition, VAMCs in FY99 provided more than 4.4 million outpatient mental health care visits to patients with substance abuse disorders. Thus, the sheer size of the VA health care system, nationwide service area, and detailed computerized medical records provide an unparalleled source of information on substance abuse patients' use of aftercare services. Because financial barriers are substantially reduced or eliminated for VA patients, nonfinancial barriers such as distance can be examined more clearly than in other health care systems. In addition, VA patients travel relatively far to reach their usual source of care (Burgess & DeFiore, 1994), thereby allowing examination of a greater range of the distance–service use relationship.

The goal of this study was to examine the role of distance in VA substance abuse patients' utilization of mental health aftercare. We examined whether patients who live farther from their source of VA outpatient mental health care were less likely to receive mental health services following inpatient substance abuse treatment. For patients who made the initial

choice to obtain aftercare, we evaluated the extent to which travel distance altered levels of aftercare utilization.

2. Methods

2.1. Data sources

The data for this study were obtained from clinical and administrative health service databases maintained by the VA. These databases include records of all inpatient and outpatient treatment delivered through VA facilities and reimbursable treatment delivered by non-VA providers. Additional data were obtained from the American Hospital Association (AHA) Annual Survey of Hospitals and the Area Resource File (ARF), compiled by the Office of Health Professions Analysis and the Research Bureau of Health Professions.

2.2. Patient selection

Our sample included patients admitted to substance abuse units of VA acute care hospitals in the continental United States (excluding Alaska) during FY93. VA inpatient substance abuse treatment has dropped precipitously in recent years (Piette & Fong, 2000). Thus, by using an earlier year rather than the most recent fiscal year, we were able to identify a larger sample. This strategy seemed reasonable since there is no reason to expect that the relationship between distance and service use would be affected by recent historical trends.

A total of 54,172 patients hospitalized for substance abuse treatment were identified. From this initial sample, we excluded patients who were discharged against medical advice, were rehospitalized or died within 90 days of the index discharge, or did not have a valid zip code of residence. The resulting analytic sample included a total of 33,952 patients who received inpatient substance abuse treatment and were eligible for outpatient aftercare.

2.3. Variable definition

Using inpatient records, we obtained patients' sociodemographic characteristics, psychiatric comorbidities, and the specific substance(s) used by the patient (Table 1).

To control for nonpsychiatric medical comorbidities that could influence aftercare attendance, we used the Charlson comorbidity index (Charlson, Pompei, Ales, & MacKenzie, 1987) as modified by Deyo, Cherkin, and Ciol (1992) for use with ICD-9 codes. We calculated patients' medical comorbidity scores using diagnoses recorded during the index episode and all other inpatient admissions in the prior 12 months. We used the distance from the patient's residence to the nearest VA facility offering aftercare services, rather than distance to an outpatient clinic in which services were actually received, to measure geographic access to aftercare. This choice was made to ensure that measurement was consistent for patients who did and did not receive aftercare. Distance was defined as the straight-line distance from the center of the patient's five-digit zip code to the center of the

Table 1

Sociodemographic and clinical characteristics of 33,952 VA patients receiving inpatient substance abuse treatment during fiscal year 1993

	<i>N</i>	Percent or mean \pm S.D.
<i>Geographic access (distance to nearest outpatient facility)</i>		
10 miles or less	19,709	58.1
11–25 miles	5903	17.4
26–50 miles	4658	13.7
Greater than 50 miles	3682	10.8
<i>Patient demographics</i>		
Used aftercare within 90 days	19,034	56.1
Age		42.6 \pm 10
Male	33,409	98.4
Black	13,508	39.8
White	18,274	53.8
Other race	2170	6.4
Married	7181	21.2
Service connected eligibility	8904	26.2
<i>Substance abuse diagnoses</i>		
Alcohol only	13,072	38.5
Drug only	4033	11.9
Alcohol and drug	16,847	49.6
<i>Psychiatric comorbidities</i>		
One or more psychiatric comorbidities	22,989	67.7
Bipolar depression	812	2.4
Unipolar depression	3242	9.5
PTSD	5428	16.0
Schizophrenia	861	2.5
Antisocial personality disorder	1208	3.6
<i>One or more prior hospitalizations</i>	6016	17.7
<i>Comorbid medical diagnoses^a</i>		
Charlson index = 0	29,824	87.8
Mean Charlson index for remainder	4128	1.33 \pm 0.9
<i>Hospital characteristics</i>		
Teaching	19,615	57.8
Medical school affiliate	25,734	75.8
<i>County level demographics</i>		
Population density		3498.2 \pm 8516
Percent non-white collar		27.5 \pm 17
Percent white collar workers		55.4 \pm 7
Percent high school graduates		75.8 \pm 7
Unemployment rate		7.2 \pm 2

^a The Charlson index ranges from 0 to 4+. Higher scores indicate greater comorbidity.

Table 2

Logistic regression estimates of the effects of distance and individual, hospital and regional characteristics on the probability of receiving aftercare

	Adjusted odds ratio	95% confidence interval
<i>Geographic access^a</i>		
Distance (up to 10 miles)	2.56***	2.32–2.81
Distance (11–25 miles)	1.91***	1.72–2.13
Distance (26–50 miles)	1.21***	1.08–1.35
<i>Patient demographics</i>		
Age (5-year increments)	0.95***	0.93–0.96
Married	1.23***	1.16–1.32
Service connected eligibility	1.12**	1.04–1.18
<i>Clinical characteristics</i>		
Marijuana use disorder	1.14**	1.06–1.23
Amphetamine use disorder	1.27**	1.07–1.50
Bipolar depression	1.46**	1.20–1.79
Unipolar depression	1.20**	1.07–1.34
PTSD	1.56***	1.37–1.78
Schizophrenia	1.44***	1.19–1.75
Antisocial personality disorder	0.81**	0.69–0.94
Number of psychiatric diagnoses	1.15***	1.09–1.22
<i>Medical comorbidity index</i>		
1	0.81***	0.74–0.89
2	0.66***	0.51–0.84
3	0.69	0.47–1.01
4	0.77	0.47–1.23
>4	0.51*	0.23–1.12
<i>Hospital characteristics</i>		
Teaching	1.18***	1.10–1.26
Medical school affiliate	0.95	0.88–1.02
<i>County-level demographics</i>		
Percent non-white collar	1.16	0.91–1.48
Percent white collar	0.15***	0.09–0.25
Percent high school graduates	12.97***	6.52–25.80
Unemployment rate	0.03**	0.00–0.16

Initial likelihood = 46,567.25. Reduction in likelihood = 13,539.41. $df = 33$, $P < .0001$.

^a Reference group for distance: patients who traveled more than 50 miles.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Table 3

Multiple linear regression analysis predicting number of outpatient aftercare visits for 19,034 veterans beginning aftercare within 90 days of discharge

	Unstandardized coefficient	t (df= 1)
<i>Geographic access^a</i>		
Distance (up to 10 miles)	2.80***	3.82
Distance (11–25 miles)	0.67	0.99
Distance (26–50 miles)	0.02	0.04
<i>Patient demographics</i>		
Age (5-year increments)	0.04**	3.08
Black	– 0.51*	2.24
Hispanic	1.03*	1.99
Other race	– 1.03	1.87
Married	– 1.20***	5.27
Service connected eligibility	– 1.05***	4.93
<i>Clinical characteristics</i>		
Drug use disorder	3.14***	9.45
Alcohol and drug use disorder	0.93***	4.16
Amphetamine use disorder	1.68**	2.99
Other drug use disorder	– 1.75**	2.78
Bipolar depression	– 1.53**	2.92
PTSD	0.70*	2.02
Antisocial personality disorder	– 1.68**	3.46
Other personality disorder	– 1.45**	4.48
Other psychiatric disorder	– 1.09*	2.22
Prior hospitalization	0.33	1.40
Other outpatient treatment	8.88***	47.35
<i>Medical comorbidity index</i>		
1	– 0.67*	2.06
2	– 2.35*	2.62
3	– 1.66	1.25
4	0.14	0.08
>4	2.63	0.78
<i>Hospital characteristics</i>		
Teaching	1.50***	6.10
Medical school affiliate	– 1.75***	6.43
<i>County-level demographics</i>		
Percent non-white	5.89***	6.87
Percent white collar	– 18.45***	9.34
Percent high school graduates	26.25***	10.72
Unemployment rate	18.37*	2.83

nearest outpatient facility's five-digit zip code (Garnick, Luft, & Robinson, 1987). While travel time is what actually influences service use, straight-line distance is a robust proxy for travel time in studies of geographic access to health care (Phibbs & Luft, 1995).

2.4. Definition of dependent variables and statistical analyses

Factors that influence patients' initial choice to seek specific health services may be different than the factors that influence the amount of care sought by the patient once the initial choice to obtain care is made. Thus, we used a two-part choice model to examine the use of mental health aftercare. These models have been used in previous research to study outpatient health care choices (Burgess & DeFiore, 1994) and, perhaps most significantly, as part of the Rand Health Insurance Experiment, which examined both outpatient and inpatient services (Duan, Manning, & Morris, 1983; Manning et al., 1987).

2.4.1. Use of any outpatient aftercare (yes/no)

Using outpatient records, we constructed a variable indicating whether each patient received aftercare in a VA substance abuse, psychiatric, or other mental health clinic in the 90 days following the index discharge. Our interest was in the use of aftercare in the immediate postdischarge period since aftercare attendance during this period is an important protective factor against rehospitalization (Costello, 1980; Walker et al., 1983).

Logistic regression was used to evaluate the influence of geographic access on the likelihood of having any mental health aftercare within 90 days postdischarge controlling for the potential confounding effects of patient and facility characteristics.

2.4.2. Volume of aftercare use among patients with at least one visit

For patients who received some aftercare within 90 days of discharge, the number of mental health clinic visits was calculated. An ordinary least squares (OLS) multiple linear regression analysis was performed to evaluate the influence of distance, controlling for covariates.

3. Results

3.1. Aftercare attendance

After controlling for statistically significant covariates, distance to outpatient treatment was an important predictor of aftercare attendance (Table 2). Patients who traveled 10 miles or less

Notes to Table 3:

$R^2=.14$, $F=92.33$, $df=34$, $P<.0001$. Mean number of visits = 11.7, S.D. = 14.2. OLS was determined to be an appropriate analysis after examination of the distribution of number of visits. A count data model was not required.

^a Reference group for distance: patients who traveled more than 50 miles.

* $P<.05$.

** $P<.01$.

*** $P<.001$.

were 2.6 times more likely to attend aftercare than those who traveled more than 50 miles ($OR = 2.56$, 95% $CI = 2.32, 2.81$). For those who traveled between 11 and 25 miles, the odds of attending aftercare were reduced by 65% ($OR = 1.91$, 95% $CI = 1.72, 2.13$). Based on the resulting model, the probability of attending aftercare for a representative patient (a 43-year-old married Caucasian male treated for alcohol abuse with no prior inpatient treatment and no comorbid psychiatric or medical conditions) falls to less than 50% when the patient must travel more than 25 miles to receive care.

Aside from the adjusted distance effect estimates, other important predictors of aftercare use (such as community education level) also are evident from the model shown in [Table 2](#).

3.2. Volume of aftercare use

[Table 3](#) shows that once the initial choice to seek aftercare was made, patients who lived farther from the nearest outpatient facility attended fewer aftercare sessions. Patients who traveled 10 miles or less received 2.8 more aftercare sessions ($t = 3.82$, $P < .0001$) than patients who traveled more than 50 miles.

4. Discussion

To our knowledge, this study is the first to estimate the impact of distance to outpatient mental health care on aftercare attendance following inpatient substance abuse treatment. Our results demonstrate that there is a rapid decline in the probability of obtaining aftercare as distance increases. This effect remains robust even after controlling for factors that are known to influence receipt of outpatient aftercare, such as psychiatric and medical comorbidities, age, and community demographics.

These results are particularly compelling in a study of VA patients since they incur no out-of-pocket costs for their care. Thus, we implicitly controlled for other common barriers to health care access such as the extent to which outpatient mental health services are covered by a patient's insurance benefits. Nevertheless, the degree to which our findings can be generalized to other populations may be limited by the fact that our study was restricted to a group of predominately male veterans.

The initial choice to seek mental health aftercare was predicted by different factors than the volume of aftercare received once the decision to seek care was made. However, volume of aftercare use was also influenced by distance. The effect of distance on the volume of aftercare use tapered off at distances exceeding 10 miles, which may reflect the fact that those who live farther away (i.e., in rural areas) may be slightly more willing to travel greater distances because the time to travel a mile in rural areas is less.

In contrast with the initial choice to seek aftercare, the volume of aftercare use appears to be influenced by patients' race, and type of substance abuse. Although the focus of this study was distance, the differences between characteristics that influence the choice to seek care versus the volume of care received are not fully understood and suggest the need for further research.

With ongoing emphasis on health care reform and cost reduction, our findings suggest that attention should be paid to geographic access. If greater aftercare utilization is a priority in seeking to reduce readmissions and recidivism, aftercare services may need to be located closer to the homes of patients. In addition, geographic access is an issue of increasing importance as more and more inpatient care is shifted to high intensity outpatient care.

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Use of a 'microecological technique' to study crime incidents around methadone maintenance treatment centers

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ABSTRACT

Aims Concern about crime is a significant barrier to the establishment of methadone treatment centers (MTCs). Methadone maintenance reduces crime among those treated, but the relationship between MTCs and neighborhood crime is unknown. We evaluated crime around MTCs. **Setting** Baltimore City, MD, USA. **Participants** We evaluated crime around 13 MTCs and three types of control locations: 13 convenience stores (stores), 13 residential points and 10 general medical hospitals. **Measures** We collected reports of Part 1 crimes from 1 January 1999 to 31 December 2001 from the Baltimore City Police Department. **Design** Crimes and residential point locations were mapped electronically by street address (geocoded), and MTCs, hospitals and stores were mapped by visiting the sites with a global positioning satellite (GPS) locator. Concentric circular 'buffers' were drawn at 25-m intervals up to 300 m around each site. We used Poisson regression to assess the relationship between crime counts (incidents per unit area) and distance from the site. **Findings** There was no significant geographic relationship between crime counts and MTCs or hospitals. A significant negative relationship (parameter estimate -0.3127 , $P < 0.04$) existed around stores in the daytime (7 am–7 pm), indicating higher crime counts closer to the stores. We found a significant positive relationship around residential points during daytime (0.5180 , $P < 0.0001$) and at night (0.3303 , $P < 0.0001$), indicating higher crime counts further away. **Conclusions** Methadone treatment centers, in contrast to convenience stores, are not associated geographically with crime.

Keywords Crime, geocoding, methadone maintenance, neighborhood, spatial analysis.

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INTRODUCTION

The aim of this study is to determine whether there is a geographic relationship between methadone treatment centers (MTCs) and neighborhood crime. Methadone maintenance is well established as an effective treatment for opiate dependence [1–3]. Opioid dependence is a global public health problem, with an estimated 24–32 million opioid users (12–14 million heroin users) worldwide in 2009, including 3.1–3.5 million users in Europe [4]. Nevertheless, access to treatment is limited in many communities that oppose the establishment of new methadone maintenance treatment centers (MTCs), due

largely to concerns about crime [5,6]. This resistance exists despite extensive research over several decades, showing that methadone maintenance treatment decreases crime among treated patients. For example, a study of 1075 heroin users found that methadone maintenance plus psychosocial treatment decreased crime, resulting in decreased societal costs [7].

Community concerns about MTCs causing crime reflect a difference between 'clinical' and 'ecological' perspectives. While the clinical perspective has established that successfully treated patients commit fewer crimes [8], there is no empirical evidence on the ecological relationship between MTCs and neighborhood crime. Three

possible relationships could exist, and plausible theories support each relationship. MTCs could decrease neighborhood crime by treating opiate users who live nearby, thereby decreasing their risk of criminal behavior. MTCs could increase crime if they attract untreated or partially treated users into the neighborhood, thereby increasing the local density of people likely to commit crimes [9]. Finally, MTCs could have no crime impact if neighborhood crime relates largely to other factors.

This study addresses the debate by evaluating relevant empirical data with a technique that has not been applied previously to this issue. Previous studies of the geographic (spatial) relationship between locations of substance availability (e.g. alcohol outlets, location of illegal drug possession and sales) and crime have used relationships between locations and crime rates averaged over large areas, typically postal codes or census tracts [9–11]. This study is the first of which we are aware to use a more fine-grained ‘microecological’ approach. Instead of studying a population of patients or a large geographic area where the MTCs are located, we evaluated crime rates in terms of increasing spatial distance *within* individual MTC neighborhoods.

The study was conducted in Baltimore, MD, USA, an urban environment with a high rate of heroin use [12,13] and high crime rate [14]. The city had 16 methadone treatment centers (MTCs) in operation during the study period. A comparison of crime before and after the establishment of MTCs was not possible, because most of the MTCs in Baltimore had been in operation before the advent of geocodable electronic crime data.

METHODS

Details of the ‘microecologic technique’ have been published previously [15]. In brief, we obtained a database listing all Federal Bureau of Investigation (FBI) Uniform Crime Report ‘Part 1’ crimes [homicide, sexual assault, robbery, aggravated assault, burglary, larceny (including theft from a motor vehicle), auto theft and arson] [16] in Baltimore City, MD, from 1 January 1999 to 31 December 2001 from the Baltimore City Police Department. We identified 16 MTCs operating in Baltimore during this study period. One was excluded because it was located on the sixth floor of a general medical hospital, making it impossible to differentiate its crimes from those associated with the hospital. Three of the remaining MTCs were analyzed as one clinic, because their front entrances were within 25 m of each other, making it impossible to analyze their crime data separately. Thus, we included data from 13 MTCs whose characteristics we obtained by telephone survey (Table 1). Of these, eight were on the campus of or near a hospital, but not in the same building as the hospital. Four MTCs offered buprenorphine for

Table 1 Characteristics of 13^a Baltimore City, Maryland methadone maintenance treatment centers (MTCs) operating 1 January 1999 to 31 December 2001.

	<i>Min</i>	<i>Max</i>	<i>Mode</i>	
Opening time	5:30 am	11 am	7 am	
Closing time	4 pm	7:30 pm	6 pm	
	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Median</i>
Daily patient census	55	600	298	300

^aIncludes combined data from three MTCs whose entrances were within 25 m of another MTC (see text).

opioid detoxification or maintenance therapy, in addition to methadone.

To help assess the significance of any relationship between MTCs and crime, we evaluated crime around three types of control sites in Baltimore City, MD. MTCs might have more crime than adjacent locations because of having higher foot traffic. High foot-traffic areas (areas with higher density of people) may have more crime than low foot-traffic areas because offenders are more likely to meet victims/targets in such areas [17]. Therefore, we selected two ‘high foot-traffic’ sites (general hospitals and convenience stores) and one ‘low foot-traffic’ site (residential points) as controls. General medical hospitals (10 in operation in Baltimore during the study period) were chosen because they, like MTCs, provide medical care. ‘Convenience stores’ were those defined as such on the Switchboard.com [18] website. Residential points were defined as addresses in the middle of a block on a small secondary street within a geographic area identified as ‘residential’ by local zoning maps.

Thirteen convenience stores and 13 residential sites were matched to the 13 MTCs based on 20 relevant census and crime variables (Table 2), which previous factor analytical research has shown can identify neighborhoods with high rates of violent crime [19]. These variables were entered into a factor analysis by Baltimore City Census Block Group (CBG); the analysis was pre-defined to generate a single factor score. Control sites were chosen for each clinic so that the factor scores of their CBGs were closest to the factor score of their matched clinic. Hospitals could not be matched to the MTCs due to the limited number of hospitals (10) available for matching.

Data and geocoding

Crime locations and residential control sites were mapped electronically by ‘geocoding’ their street addresses using the ArcGIS 9 computer program [20]. Geocoding is a computerized process in which a street address is con-

Table 2 Variables used in the factor analysis for matching census block groups of methadone maintenance treatment centers (MTCs) and control study sites.

Census variables
% Staying at the same house for more than 5 years
Population per square mile
Household size
% Female-headed households
% People with no high school diploma
Per capita income
Median household income
Percent with income below poverty level
% Service workers
% People unemployed
% Households with public assistance income
% Households with no worker
% Non-white
'Racial heterogeneity' (count of different races reported)
% Vacant houses
% Households renting home
Median gross rent
Median value of owner-occupied home
Crime variables
Total crimes in 2000
Total drug-related crimes

verted into a map location (latitude and longitude) [21]. The locations of MTCs, convenience stores and hospitals were determined by visiting the sites and reading the latitude and longitude on a global positioning satellite (GPS) locator. Site visits were necessary in these cases, because street addresses of non-residential sites are sometimes not precise enough to generate an accurate latitude and longitude. For example, convenience stores are sometimes located in large parking lots or malls, along with other stores. In order to maintain the privacy of people living at the residential sites, the locations of the residential sites were found by geocoding, rather than by visiting the site.

'Buffering' sites and counting crimes

We used a 'buffer' methodology to determine the geographic relationship between study sites and neighborhood crime. Concentric circular, non-overlapping, doughnut-shaped buffers were defined at 25-m intervals for up to 300-m radius around each study site. Crimes were counted within each buffer. In order to compare crime quantitatively across buffers of increasing size, the number of crimes was corrected for the area of each buffer to generate crime counts per unit area ('crime counts'). To avoid crime counts <1, the 'unit area' was defined as 1962.5 m² [the size of the smallest (25-m) buffer]. Similar buffer methodologies have been used to study crime around housing projects [22] and supportive housing [23].

Statistical analysis

Poisson regression analyses were used to evaluate the relationship between crime counts and distance from a site. First, a generalized additive model (GAM) with a spline term was used to fit a line to scatter-plots to visualize the data. The GAM graphs indicated that most of the variation in crime incidents was within the first 100 m (first four buffers) of the sites (data not shown). Thus, further data analysis included only crime incidents within 100 m of the study sites. Further analyses used a Poisson distribution and generalized linear model to analyze crime counts around the study sites, generating a parameter estimate (β) through a least-squares analysis. A significant positive β ('positive crime slope') indicates a higher crime rate with increasing distance from the study site, while a significant negative β ('negative crime slope') indicates a higher crime rate closer to the study site. All analyses were performed with SAS version 9.1 [24].

'Within-group' comparisons to evaluate the relationship between crime counts and distance from the site (crime slopes) were performed separately for MTCs, convenience stores, hospitals and residential points. Because crimes can occur at night, when MTCs are closed, we controlled for time of day by analyzing separately crimes occurring during the day (7 a.m.–7 p.m.), the hours when most MTCs are open (Table 1), and at night (7 p.m.–7 a.m.).

RESULTS

There was no significant change in crime counts with increasing distance from MTCs or hospitals (Fig. 1), as indicated by non-significant values for parameter estimates of crime slopes (Table 3). In contrast, there was a significant decrease in crime counts with increasing distance from convenience stores during both daytime and night-time (Fig. 1, Table 3, daytime parameter estimate -0.3127 , $P < 0.04$, night time parameter estimate -0.3235 , $P < 0.0623$). Around residential sites, there was a significant increase in crime counts, with increasing distance from the site during both daytime (0.5180 , $P < 0.0001$) and night-time (0.3303 , $P < 0.0001$).

DISCUSSION

This study found no significant change in crime counts with increasing distance (up to 100 m) from MTCs, suggesting that MTCs are not a geographic focus for crime. In contrast, there was a significant decline in crime counts with increasing distance from convenience stores and a significant increase in crime counts with increasing

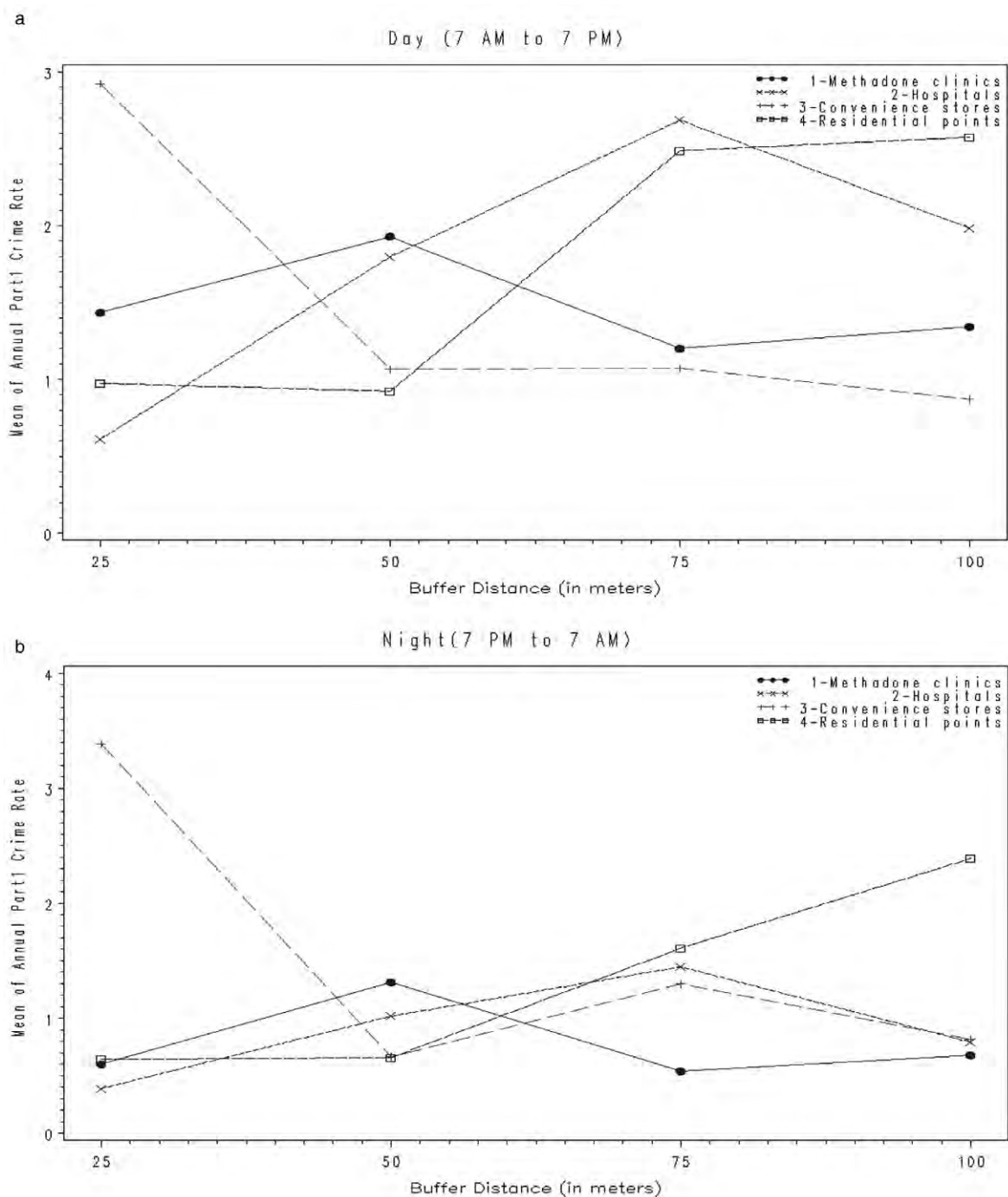


Figure 1 Crime rates around methadone maintenance treatment clinics, general medical hospitals, convenience stores and residential points in Baltimore City, MD (1999–2001). Crimes were all Federal Bureau of Investigation (FBI) Part I crimes [homicide, sexual assault, robbery, aggravated assault, burglary, larceny (including theft from a motor vehicle), auto theft, and arson] reported in Baltimore City, MD between 1 January 1999 and 31 December 2001. Crime rate—crimes per 'unit area' (1962 m², the area of a 25-m circle/buffer). Buffer distance—radius of circular/doughnut-shaped areas defined around study sites. Study sites were 13 methadone maintenance treatment centers (MTCs), 10 general medical hospitals, 13 convenience stores and 13 residential points (residential addresses in the middle of the block on secondary streets). Convenience stores were matched to the MTCs by neighborhood characteristics (see text for details). Mapping of locations was based on street address for crime locations and residential sites and global positioning satellite (GPS) for other sites. (a) Crimes between 7 a.m. and 7 p.m., when MTCs are open. (b) Crimes between 7 p.m. and 7 a.m., when MTCs are closed

Table 3 Poisson regression analysis of the relationship between crime counts^a and distance (≤ 100 m) from study site.

Type of site	Time of day	Parameter estimate ^b	Standard error	Lower confidence limit	Upper confidence limit	Z	P value
MTC ^c [13]	Day ^d	-0.0938	0.2243	-0.5334	0.3457	-0.42	0.6757
	Night ^e	-0.1614	0.2167	-0.5862	0.2634	-0.74	0.4564
Convenience Store [13]	Day	-0.3127	0.1553	-0.6171	-0.0083	-2.01	0.0441
	Night	-0.3235	0.1735	-0.6635	0.0166	-1.86	0.0623
Residential Site [13]	Day	0.3303	0.0511	0.2302	0.4304	6.47	<.0001
	Night	0.518	0.0947	0.3325	0.7035	5.47	<.0001
General medical hospital [10]	Day	0.086	0.1353	-0.1792	0.3511	0.64	0.5251
	Night	-0.056	0.1533	-0.3564	0.2443	-0.37	0.7146

^aCrime count: number of crime incidents per area in each concentric ring at 25-m intervals around the site. ^bParameter estimate: estimated 'crime slope' relating crime counts with distance from study site. Positive parameter estimate indicates increasing crime counts with increasing distance from the site. Negative parameter estimate indicates decreasing crime counts with increasing distance from the site. ^cMTC: methadone maintenance treatment center.

^dDay: 7 a.m.–7 p.m. ^eNight: 7 p.m.–7 a.m. Italics indicate significant results.

distance from the residential sites, indicating that the microecological technique is capable of detecting places that are or are not geographic foci of crime. The observed crime pattern around convenience stores (high foot-traffic areas) and around residential sites (low foot-traffic areas in the middle of small residential blocks) is consistent with the previously shown positive correlation between crime and increased density of people at a site [17]. Overall, the pattern of findings supports the validity and sensitivity of our microecological technique, and strengthens confidence in our primary finding of no significant increase in crime counts closer to MTCs.

An estimated 282 000 Americans were dependent on or abusing heroin and another 1.72 million were dependent on or abusing prescription pain relievers in 2008 [25]. In contrast, only about 265 000 patients were receiving opiate agonist treatment in 1108 US treatment facilities [26]. The European Union had more than 1 million regular opioid users in 2006, but only 25 000 patients receiving methadone maintenance treatment [27]. Thus, there is a public health need for more MTCs to treat the large numbers of people addicted to opiates. Our finding that MTCs are not associated with increases in neighborhood crime addresses a major impediment to the establishment of new clinics, and should lead to greater availability of methadone maintenance treatment for the many people who need it.

This study has several strengths, including the use of a microecological technique that evaluates geographic neighborhoods rather than patient populations, use of control sites matched to the MTCs to minimize confounding by degree of foot traffic and other neighborhood characteristics known to influence crime rates, and the inclusion of data from all but one of the MTCs operating in Baltimore City during the study period.

This study has several limitations. First, the data show substantial variability, as reflected in large confidence

intervals. For example, although methadone clinics and residential points have different crime slopes (different sign for the parameter estimate), there is no significant interaction term between the two groups when they are compared in a between-groups comparison. Secondly, this study has uncertain external validity because it involved a relatively small number [15] of MTCs in a single city. However, there is no obvious manner in which Baltimore City MTCs differ from those in other areas of the United States or abroad, nor is there any reason that the neighborhood factors influencing crime in Baltimore should differ from those elsewhere. Indeed, Baltimore may be an 'ideal' setting for this type of study, given its high rate of heroin use (Baltimore has been called the 'heroin capital' of the United States [12,13]), urban environment and high crime rate [14].

The stigma against methadone maintenance treatment, including concerns about crime, exists throughout the world [28–31], regardless of whether methadone is dispensed in centralized methadone treatment centers or by prescription through community pharmacies. For example, a survey of pharmacists in England found that many expressed concern about shoplifting and aggression if they were to begin to dispense methadone [32]. Residents both in the United Kingdom and Canada voice fears that methadone treatment centers may increase crime, resulting in difficulty opening or keeping open methadone clinics [33–35]. This study provides strong evidence against a major reason for the social stigma concerning methadone maintenance, i.e. concerns about crime. A major issue in the NIMBY ('not in my back yard') phenomenon for MTCs is the need for patients to come in daily for dosing. Buprenorphine, an opioid partial agonist now used in many countries for opioid substitution, can be prescribed by physicians and dispensed for home administration. Because there is no need for patients to come to a specialized clinic for regular dosing, the hope is

that buprenorphine treatment will be less stigmatized and better accepted than methadone treatment.

Finally, a key conceptual issue for any study involving crime is how to quantify crime. Three major parameters have been used to measure crime in social science studies, each with its own advantages and disadvantages: crime incidents (used in this study), arrests and 911 calls. Crime incidents, being generated from complaints of crime, are not subject to policy changes in police enforcement, unlike arrest data. However, incident data have the disadvantage of not recording 'victimless' crimes, such as many drug crimes. Databases of 911 calls have the disadvantage of containing a large number of 'unfounded' events; that is, when the police arrive at the scene of the call, there is no evidence of the reported crime. However, 911 databases may be a more sensitive measure of community concerns about crime.

Overall, our data show that MTCs are not a geographic focus of crime, thus providing both strong evidence to alleviate neighborhood concerns about the establishment and operation of MTCs and quantitative information to combat the stigma of methadone substitution treatment. As more MTCs open and more geocodable crime data become available, future research can attempt to confirm and expand our findings using before-and-after designs and different types of crime data.

CONCLUSION

This study found no significant increase in crime around MTCs, while finding the expected significant increase around convenience stores, which also have high foot traffic. These results do not support the common neighborhood concern of MTCs as geographic foci of crime, and may ease the establishment of new MTCs. Studies using the microecological technique may inform more clearly the social and political debate around the siting of MTCs.

Declarations of interest

SB is Medical Director of the Baltimore Veterans Affairs Medical Center Opiate Agonist Treatment Program. Otherwise, the authors have no conflicts of interest in relation to this study or connection with the tobacco, alcohol, pharmaceutical or gaming industries. There are no contractual constraints on publishing this study.

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METHADONE MAINTENANCE TREATMENT

Methadone maintenance treatment (MMT) can help injection drug users (IDUs) reduce or stop injecting and return to productive lives. However, its use is still sometimes publicly controversial and many factors limit the effectiveness of MMT services. New federal regulations, which have overhauled the MMT system, promise a more flexible approach and improved delivery of these needed, life-saving services.

Opiate Addiction Is a Major Individual and Public Health Problem

It is estimated that at least 980,000 people in the United States are currently addicted to heroin and other opiates (such as oxycontin, dilaudid, and hydrocone). They risk premature death and often suffer from HIV, hepatitis B or C, sexually transmitted disease (STDs), liver disease from alcohol abuse, and other physical and mental health problems. It is estimated that 5,000-10,000 IDUs die of drug overdoses every year. Many are involved with the criminal justice system.

A 1997 National Institutes of Health (NIH) report estimated the financial costs of untreated opiate addiction at \$20 billion per year. These costs, combined with the social costs of destroyed families, destabilized communities, increased crime, increased disease transmission, and increased health care costs, mean that opiate addiction is a major problem for affected individuals and society.

Methadone Maintenance Treatment Is the Most Effective Treatment for Opiate Addiction

Methadone is a synthetic agent that works by "occupying" the brain recep-

tor sites affected by heroin and other opiates. Methadone:

- blocks the euphoric and sedating effects of opiates;
- relieves the craving for opiates that is a major factor in relapse;
- relieves symptoms associated with withdrawal from opiates;
- does not cause euphoria or intoxication itself (with stable dosing), thus allowing a person to work and participate normally in society;
- is excreted slowly so it can be taken only once a day.

Methadone maintenance treatment, a program in which addicted individuals receive daily doses of methadone, was initially developed during the 1960s as part of a broad, multicomponent treatment program that also emphasized resocialization and vocational training.

Methadone maintenance treatment has important benefits for addicted individuals and for society.

These benefits include:

- reduced or stopped use of injection drugs;
- reduced risk of overdose and of acquiring or transmitting diseases

such as HIV, hepatitis B or C, bacterial infections, endocarditis, soft tissue infections, thrombophlebitis, tuberculosis, and STDs;

- reduced mortality – the median death rate of opiate-dependent individuals in MMT is 30 percent of the rate of those not in MMT;
- possible reduction in sexual risk behaviors, although evidence on this point is conflicting;
- reduced criminal activity;
- improved family stability and employment potential; and
- improved pregnancy outcomes.

Using commonly accepted criteria for medical interventions, several studies have also shown that MMT is extremely cost-effective.

Key Issues in Effective Methadone Maintenance Treatment

Dose

Most patients require a dose of 60-120 mg/day to achieve optimum therapeutic effects of methadone. Compared to those on lower doses, patients on higher doses are shown to stay in treatment

longer, use less heroin and other drugs, and have lower incidence of HIV infection. Some patients need even higher doses for fully effective treatment.

Studies of methadone effectiveness have shown a dose-response relationship, with higher doses more effective in reducing heroin use, helping patients stay in treatment, and reducing criminal activity. Despite compelling evidence that doses need to be determined on an individual basis, that higher doses are more effective, and that doses of 60-120 mg/day are required for most patients, some clinics administer fixed doses to all patients and provide less than optimal doses.

Length of treatment

Studies have shown that good outcomes from substance abuse treatment are unequivocally contingent on adequate length of treatment. A research-based guide on the principles of substance abuse treatment, released in 1999 by the National Institute on Drug Abuse (NIDA), notes that "For methadone maintenance, 12 months of treatment is the minimum, and some opiate-addicted individuals will continue to benefit from methadone maintenance treatment over a period of years." Despite this fact, the majority of MMT patients leave before 1 year, either because they drop out, the clinic encourages them to leave, or they are discharged for not complying with program regulations. Most of those who discontinue MMT later relapse to heroin use. This illustrates the difficulty of the addiction recovery process and the fact that individuals may need multiple episodes of treatment over time.

The need to tailor treatment to subgroups of IDUs and to individual patients

IDUs come to MMT with a broad range of issues and problems in addition to their drug addiction. For example, about 40 percent of patients entering methadone treatment use cocaine or crack as well as heroin; perhaps a

quarter also abuse alcohol. Studies have shown that 67-84% of MMT patients have been infected with hepatitis C. About 10 million people in the U.S. have co-occurring substance abuse and mental disorders; more than 40 percent of those with addictive disorders also have mental disorders. IDUs frequently have unstable living situations and may need multiple social services. Treatment programs tailored to the specific needs of patients can respond more effectively to these varied types of patients.

Continued use of heroin, cocaine, alcohol, and other drugs

It is relatively common for MMT patients to continue using heroin, other drugs such as cocaine or marijuana, and alcohol after admission to treatment. This reflects the long history of use, the complexity of patients' situations and reasons for using drugs, and the biological basis of addiction. Many patients in treatment do not have complete control over their addictions at all times. Realistic expectations of treatment reflect the understanding that recovery is a day-to-day process with occasional relapses.

The Regulation and Administration of MMT has Undergone a Radical Change

The context for change

Despite 30 years of experience and widespread acceptance by addiction specialists and health agencies, MMT has sometimes been publicly controversial in the U.S. and other countries. Critics have cited the belief that methadone treatment merely substitutes one addiction for another and that achieving a drug-free state is the only valid treatment goal. Misunderstandings about the nature of drug addiction (not seeing it as a biomedical condition) are part of the reason why MMT has sometimes been met with limited acceptance by communities, health care providers, and the public. Critics opposed to expanding

MMT programs also express concerns that they may be a magnet for crime and drug dealing and that patients will divert methadone (sell it to supplement their income or buy or sell it to help friends in withdrawal). As a result, the use of methadone to treat addiction has been heavily regulated and strictly controlled in this country. For example, until now, MMT has been delivered only through specially licensed clinics, called Opioid Treatment Programs.

These regulations and controls have meant that MMT programs have had limited flexibility and ability to respond to the needs of patients, including in such key areas as dose and length of treatment. The regulations also have limited the number of physicians who are available to treat heroin addiction and the settings and locations in which treatment can occur.

The change

In May 2001, the U.S. Department of Health and Human Services (DHHS) announced a new system for regulating and monitoring MMT. Under this new system, oversight responsibility for MMT in the United States shifted from the Food and Drug Administration (FDA) to the Substance Abuse and Mental Health Services Administration's Center for Substance Abuse Treatment (CSAT).

This new system represents a fundamental change in the approach to substance abuse treatment and in the federal government's role in ensuring effective and accountable MMT programs. It relies on accreditation of MMT programs by independent organizations and states, in accordance with treatment standards that have been developed by CSAT over the last 10 years.

These standards reflect current knowledge about the nature of opiate addiction as a chronic brain disease and the principles underlying effective long-term, comprehensive treatment. The standards are based on "best practice guidelines" and

emphasize improving quality of care in areas such as individualized treatment planning, increased medical supervision, and assessment of patients. The new system continues to accommodate community concerns, however, by retaining regulations that are designed to reduce diversion of methadone.

The designers of this new approach believe that shifting to an accreditation approach will significantly improve care for IDUs by:

- improving access to and quality of MMT programs;
- allowing for increased professional discretion and medical judgment in designing treatment plans based on individual needs, especially in managing methadone doses and length of treatment, and whether withdrawal from medication is possible or desirable;
- helping to move MMT closer to the mainstream of health care practice (this increase in the range of settings may increase MMT in physicians' offices and increase interest by hospitals and HMOs in providing these services);
- improving oversight and accountability and helping to promote state-of-the-art treatment services; and
- enhancing patient rights and patient responsibilities.

To Learn More About This Topic

Read the overview fact sheet in this series on drug users and substance abuse treatment – "Substance Abuse Treatment for Injection Drug Users: A Strategy with Many Benefits." It provides basic information, links to the other fact sheets in this series, and links to other useful information (both print and web).

Visit websites of the Centers for Disease Control and Prevention (www.cdc.gov/idu) and the Academy for Educational Development (www.health-strategies.org/pubs/publications.htm) for these and related materials:

- *Preventing Blood-borne Infections Among Injection Drug Users: A Comprehensive Approach*, which provides extensive background information on HIV and viral hepatitis infection in IDUs and the legal, social, and policy environment, and describes strategies and principles of a comprehensive approach to addressing these issues.
- *Interventions to Increase IDUs' Access to Sterile Syringes*, a series of six fact sheets.
- *Drug Use, HIV, and the Criminal Justice System*, a series of eight fact sheets.

Visit these websites:

- The Substance Abuse and Mental Health Services Administration, to learn more about the new federal regulations governing methadone treatment programs: www.samhsa.gov/news/news.html (click on Archives of News Releases and scroll down to the two May 18, 2001 releases)
- The Addiction Treatment Forum, which publishes newsletters and other information on substance abuse and addiction research, therapies, news: www.atforum.com/
- The American Methadone Treatment Association: www.americanmethadone.org/

See the October/November 2000 and January 2001 issues of the *Mt. Sinai Journal of Medicine*. The 14 papers in these two theme issues focus on a wide range of issues related to methadone maintenance treatment and its impact on IDUs, including those infected with HIV or hepatitis C. *Mt. Sinai Journal of Medicine* 2000;67(5&6) www.mssm.edu/msjournal/67/6756.shtml and 2001;68(1) www.mssm.edu/msjournal/68/681.shtml

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Department of Health and Human Services

<http://www.cdc.gov/idu>

Through the Academy for Educational Development (AED), IDU-related technical assistance is available to health departments funded by CDC to conduct HIV prevention and to HIV prevention community planning groups (CPGs). For more information, contact your CDC HIV prevention project officer at 404-639-5230 or AED at (202) 884-8952.



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UPDATED JUNE 2004

DSHS Research and Data Analysis Division, 4.49fs

Methadone Treatment For Opiate Addiction Lowers Health Care Costs And Reduces Arrests And Convictions

WASHINGTON STATE SUPPLEMENTAL SECURITY INCOME RECIPIENTS

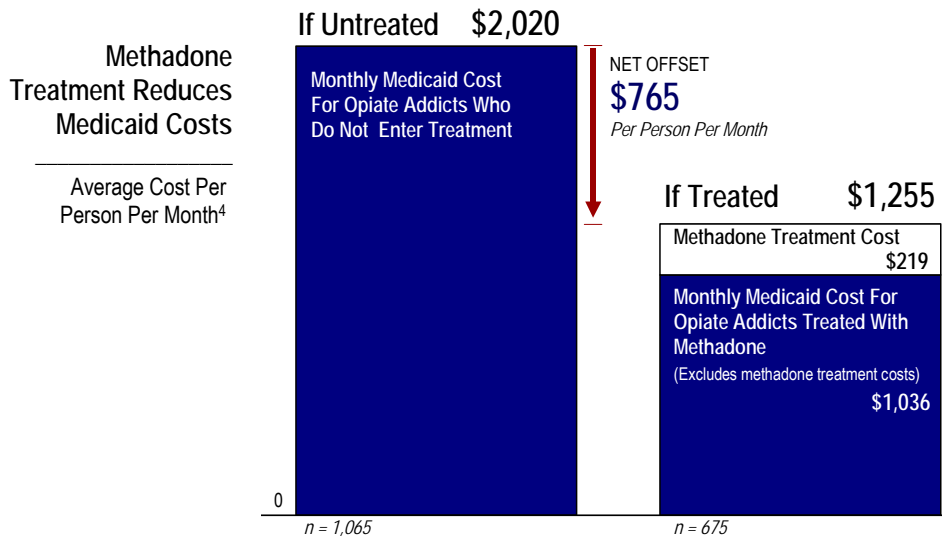
Methadone Treatment Results In Lower Health Care Costs

Medicaid-paid medical, mental health, and long-term care costs are significantly lower for persons addicted to opiates who participate in methadone treatment, compared to opiate addicts who remain untreated.¹

These cost offsets can be interpreted as **costs avoided** for clients already receiving treatment, and as **potential savings** that might be realized by treating the untreated.

- The **average net cost offset is \$765** per person per month for methadone treatment for opiate addiction.
- The average methadone **treatment cost is \$219** per person per month.²
- **Reduced medical costs account for 80 percent** of the offset.³

The chart below compares the monthly Medicaid costs for opiate addicts who do not enter treatment with costs for opiate addicts who participate in methadone treatment.



¹ Mental health costs include state psychiatric hospital, community psychiatric hospital, and outpatient mental health expenditures. Long-term care expenditures include nursing home costs. Costs reported are generally Medicaid-paid claims receiving 50/50 state/federal match. Mental health costs include some "state-only" dollars.

² The standard rate for methadone treatment is about \$10 per day; however, the average cost presented here includes those who were not in treatment for the entire follow-up period, bringing down the overall average cost per month to \$219.

³ Non-medical cost offsets include reductions in mental health (state psychiatric, community psychiatric, outpatient mental health), and nursing home costs.

⁴ Cost offsets were estimated using regression models in which the effects of covariates (age, gender, race/ethnicity, baseline medical expenditures, dual eligible status) were controlled.

Longer Stays In Methadone Treatment Result In The Greatest Cost Offset

Cost offsets were examined for different lengths of time spent in treatment. It was found that longer stays in methadone treatment result in the greatest reductions.

- For treatment stays up to 90 days, the **average monthly offset is \$725** for persons treated with methadone.
- For methadone treatment stays over 365 days, the Medicaid **cost offset averages \$899** per person per month.



ABOUT METHADONE TREATMENT

Methadone Treatment – or “opiate substitution” treatment – is an outpatient service for individuals addicted to heroin or other opiates. Under this approach, state-funded and accredited opiate substitution treatment agencies provide counseling and daily or near-daily administration of methadone or other approved substitute drugs. Patients also receive education, random urine drug screening to monitor drug use, and are subject to stringent rules regarding compliance. Methadone treatment is distinct from “drug free” treatment for opiate addiction. “Drug free” programs do not dispense methadone or other approved substitute drugs to persons addicted to opiates. A “drug free” treatment program may occur in a residential or outpatient setting. Residential modalities are generally highly structured and include intensive inpatient and long-term residential treatment. Intensive inpatient treatment typically lasts 21 to 28 days while long-term residential treatment lasts 90 days or longer.

Compared to clients receiving “drug free” treatment for opiate addiction, clients in methadone treatment tend to have more years of regular heroin use prior to treatment, more intense use of heroin in the 30 days prior to treatment, and greater dependence on income acquired through illegal activity.⁶

⁵ Cost offsets were estimated using regression models in which the effects of covariates (age, gender, race/ethnicity, baseline medical expenditures, dual eligible status) were controlled. Cost offsets are measured relative to untreated clients.

⁶ Carney, M., Elworth, J., Calsyn, D., Kivlahan, D., Peavy, M., Floyd, A., and Donovan, D., 2003. *Washington State Outcomes Project: Opiate Study Sample (Final Report)*. University of Washington Alcohol and Drug Abuse Institute, University of Washington Department of Psychiatry, and VA Puget Sound Health Care System, Seattle Division, October 2003.

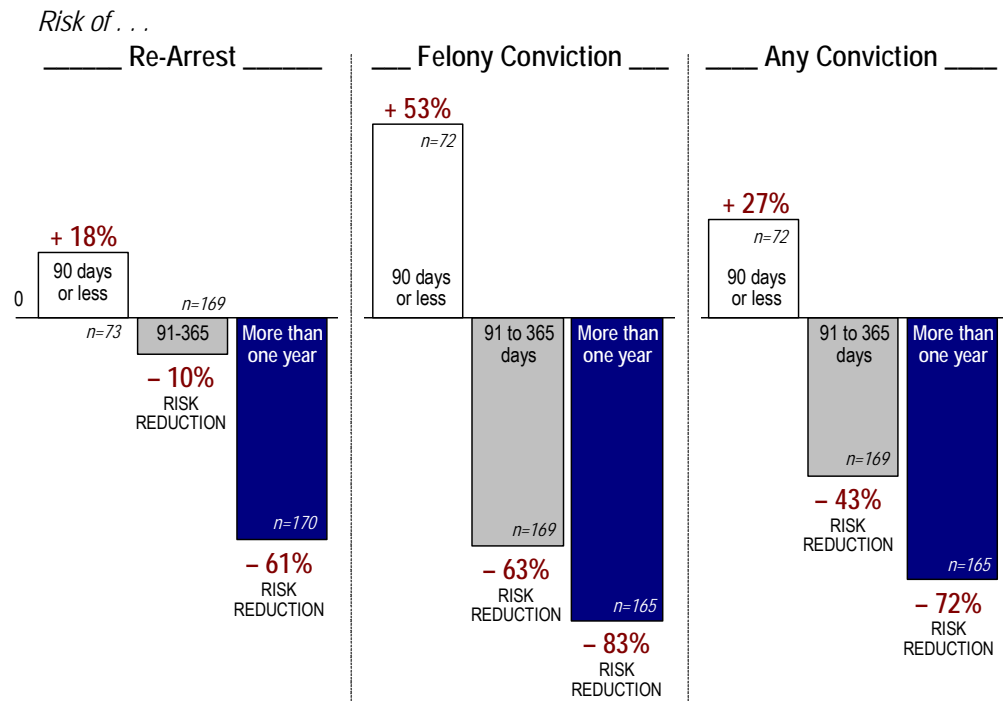
Longer Stays In Methadone Treatment Reduce The Risk Of Criminal Re-Arrest And Conviction

Stays in methadone treatment of more than 90 days are associated with a reduced risk of re-arrest or conviction. Methadone treatment stays over one year are associated with particularly dramatic reductions. Staying in methadone treatment 90 days or less is associated with an increased risk of re-arrest or conviction, which may reflect the effect of arrests or convictions in terminating treatment, or increased criminal activity that may follow relapse in use and premature exit from treatment.

- Compared to untreated opiate addicts, the risk of re-arrest is 18 percent higher for persons who stay in methadone treatment for 90 days or less, but is **10 percent lower** for those in treatment 91 to 365 days and **61 percent lower** for those who stay more than one year.⁷
- Compared to untreated opiate addicts, the risk of a felony conviction is 53 percent higher for persons in methadone treatment for 90 days or less, **63 percent lower** for opiate addicts in methadone treatment 91 to 365 days, and **83 percent lower** for those in methadone treatment for more than one year.
- Similarly, the risk of any conviction is 27 percent higher for persons who stay in methadone treatment for 90 days or less, **43 percent lower** for opiate addicts in methadone treatment 91 to 365 days, and **72 percent lower** for those who stay in methadone treatment for more than one year.

Criminal Justice Outcomes Improve With Longer Stays In Methadone Treatment

Risk relative to untreated clients with opiate addiction



⁷ Percentages reflect the change in the hazard of re-arrest or conviction, relative to untreated clients. Estimates are from proportional hazards models that control for age, gender, and race/ethnicity. The zero axis represents the baseline risk for the untreated.

TECHNICAL NOTES

This paper examines “cost offsets” – costs avoided for clients already receiving treatment or potential savings that might be realized by treating the untreated – of Medicaid medical, mental health, and long-term care costs among opiate addicts who were treated with methadone. The paper also examines criminal arrest and conviction outcomes among persons addicted to opiates who enter methadone treatment. The criminal justice analyses are restricted to clients with prior criminal histories.

The study population included clients who received Supplemental Security Income (SSI) benefits at some time between July 1997 and December 2001 and who were identified as having a substance abuse problem based on administrative records. The SSI program provides cash and medical assistance to persons with little or no income who are unable to work due primarily to disability. Results of the original study⁸ and comparisons for stimulant drug abusers⁹ and those with opiate addictions who participated in drug free chemical dependency treatment¹⁰ are also available from the authors.

The need for treatment for these clients was identified through events recorded in administrative data. Information used to identify a need for treatment included medical diagnoses or procedures; detoxification, assessment, or alcohol or drug (AOD) treatment encounters; and arrests for drug or alcohol-related offenses. Clients were included in the analysis only if they had at least one month of medical assistance eligibility both before and after the “index event” indicating a need for AOD treatment.

For this report, a subset of 3,354 persons was identified as opiate-dependent by the presence of:

- Heroin, non-prescription methadone, prescribed opiate substitutes, or other opiates and synthetics as primary, secondary, or tertiary drug of abuse in TARGET records.¹¹
- Diagnosis of opiate abuse or dependence in Medicaid claims data.

Medicaid costs of opiate-addicted clients receiving methadone treatment were compared with costs of opiate-addicted clients who remained untreated. Offsets were estimated using regression models to control for the effects of covariates such as age, gender, race/ethnicity, and baseline medical expenditures.

⁸ Estee, S. and Nordlund, D., 2003. *Washington State Supplemental Security Income (SSI) Cost Offset Pilot Project: 2002 Progress Report*. Washington State Department of Social and Health Services, Research and Data Analysis Division, February.

⁹ Nordlund, D., Estee, S. and Yamashiro, G., 2003. *Treatment of Stimulant Addiction Including Addiction to Methamphetamine Results in Lower Health Care Costs and Reduced Arrests and Convictions: Washington State Supplemental Security Income Recipients*. Washington State Department of Social and Health Services, Research and Data Analysis Division, December.

¹⁰ Nordlund, D., Estee, S., Mancuso, D. and Felver, B., 2004. *Non-Methadone Chemical Dependency Treatment for Opiate Addiction Reduces Health Care Costs, Arrests and Convictions: Washington State Supplemental Security Income Recipients*. Washington State Department of Social and Health Services, Research and Data Analysis Division, March.

¹¹ TARGET is the database maintained by the Division of Alcohol and Substance Abuse that contains a record of all publicly funded chemical dependency treatment in Washington State.

Additional copies of this fact sheet may be obtained from the following websites:

<http://www1.dshs.wa.gov/RDA/> or <http://www1.dshs.wa.gov/dasa/>

or through the Washington State Alcohol/Drug Clearinghouse by calling 1-800-662-9111 or 206-725-9696 (within Seattle or outside Washington State), by e-mailing clearinghouse@adhl.org, or by writing to 6535 Fifth Place South, Seattle, Washington 98108-0243.





Populations at risk for opioid overdose

Len Paulozzi, MD, MPH

Division of Unintentional Injury Prevention
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention
April 12, 2012

OVERVIEW OF PRESENTATION

Trends

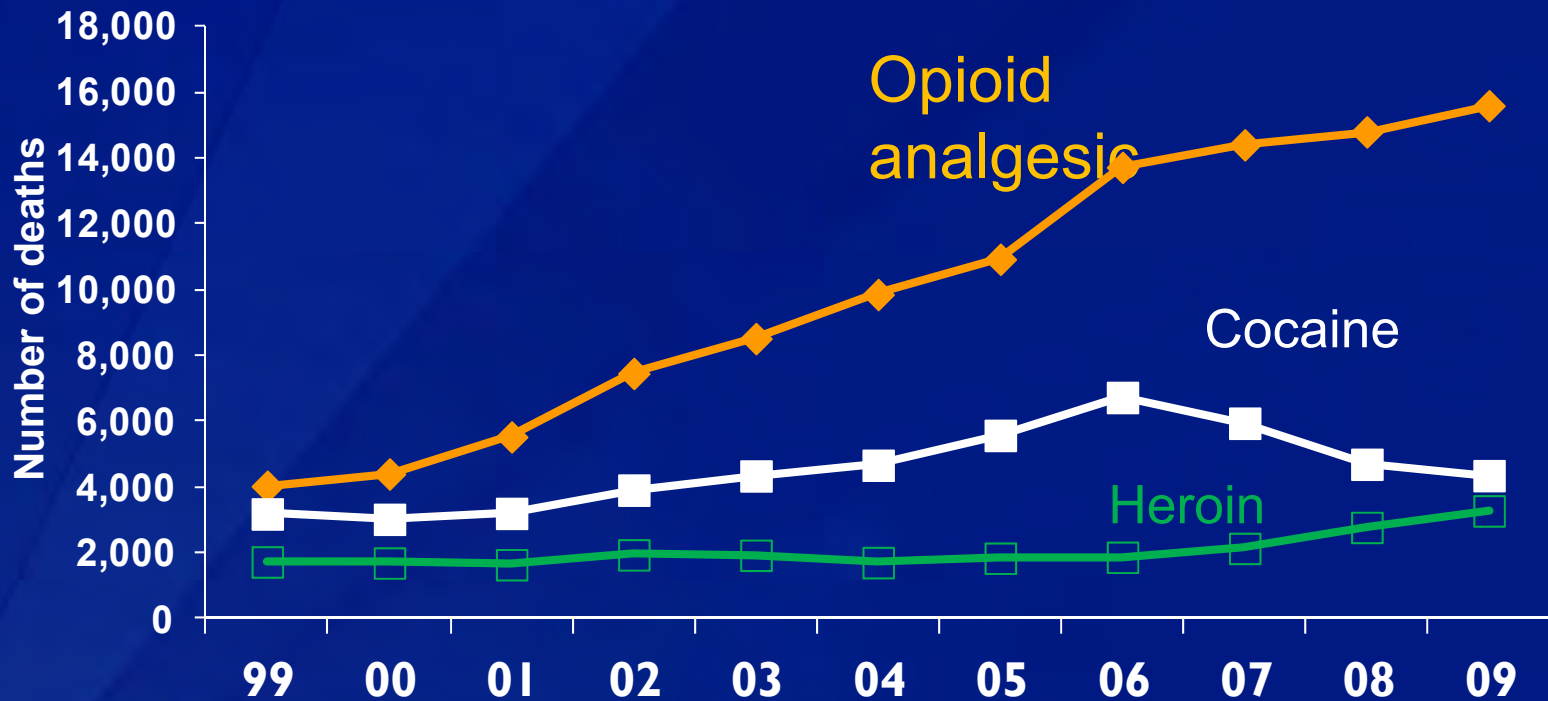
Risk factors

Demographic variables

Other personal characteristics as risks

Prescription history as a risk

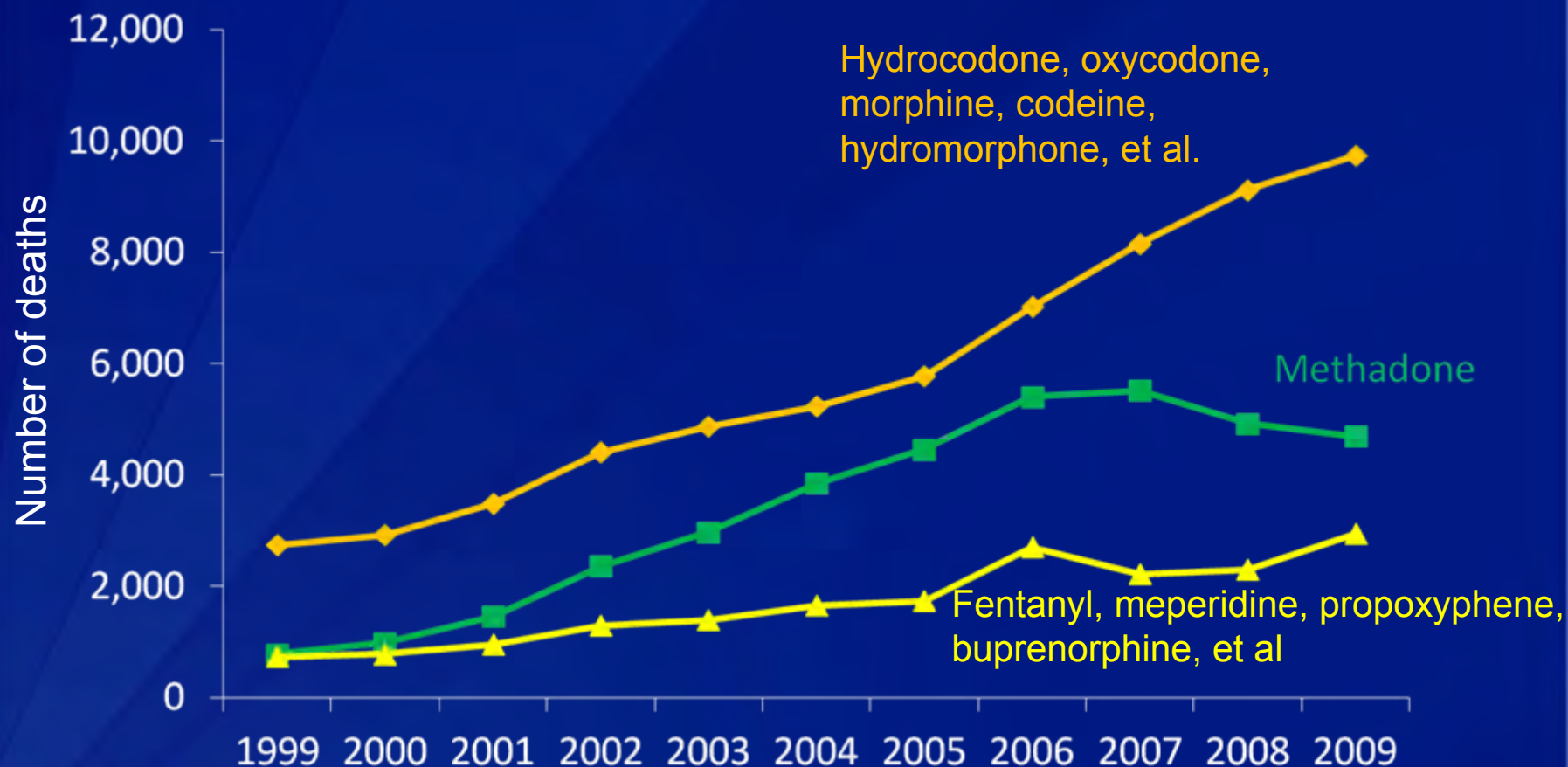
Drug overdose deaths of all intents by major drug type, U.S., 1999-2009



Source: National Vital Statistics System. The reported 2009 numbers are underestimates. Some overdose deaths were not included in the total for 2009 because of delayed reporting of the final cause of death.



Drug overdose deaths of all intents by type of opioid analgesic involved, U.S., 1999-2009



Source: National Vital Statistics System. The reported 2009 numbers are underestimates. Some overdose deaths were not included in the total for 2009 because of delayed reporting of the final cause of death.

OVERVIEW OF PRESENTATION

Trends

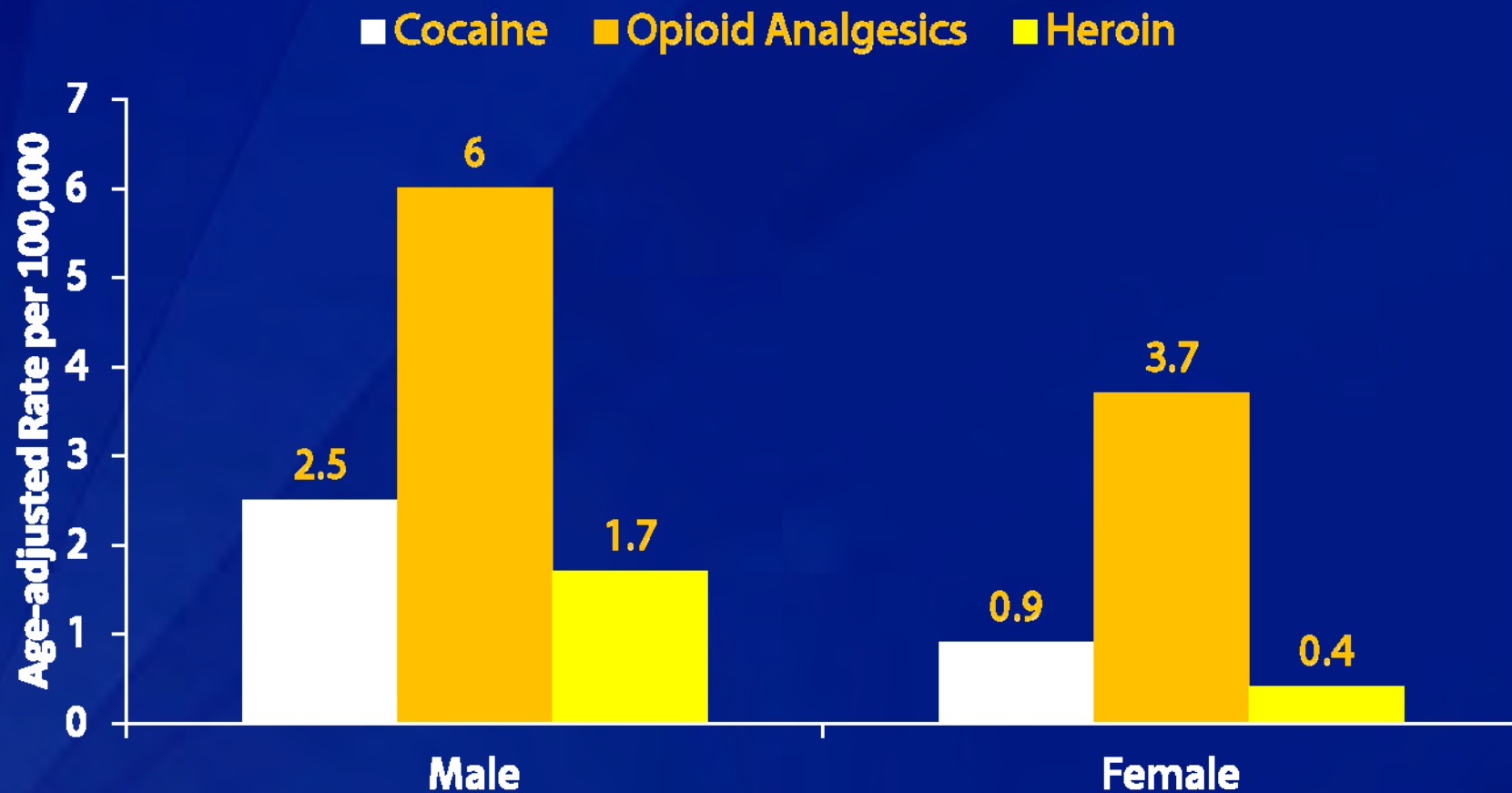
Risk factors

Demographic variables

Other personal characteristics as risks

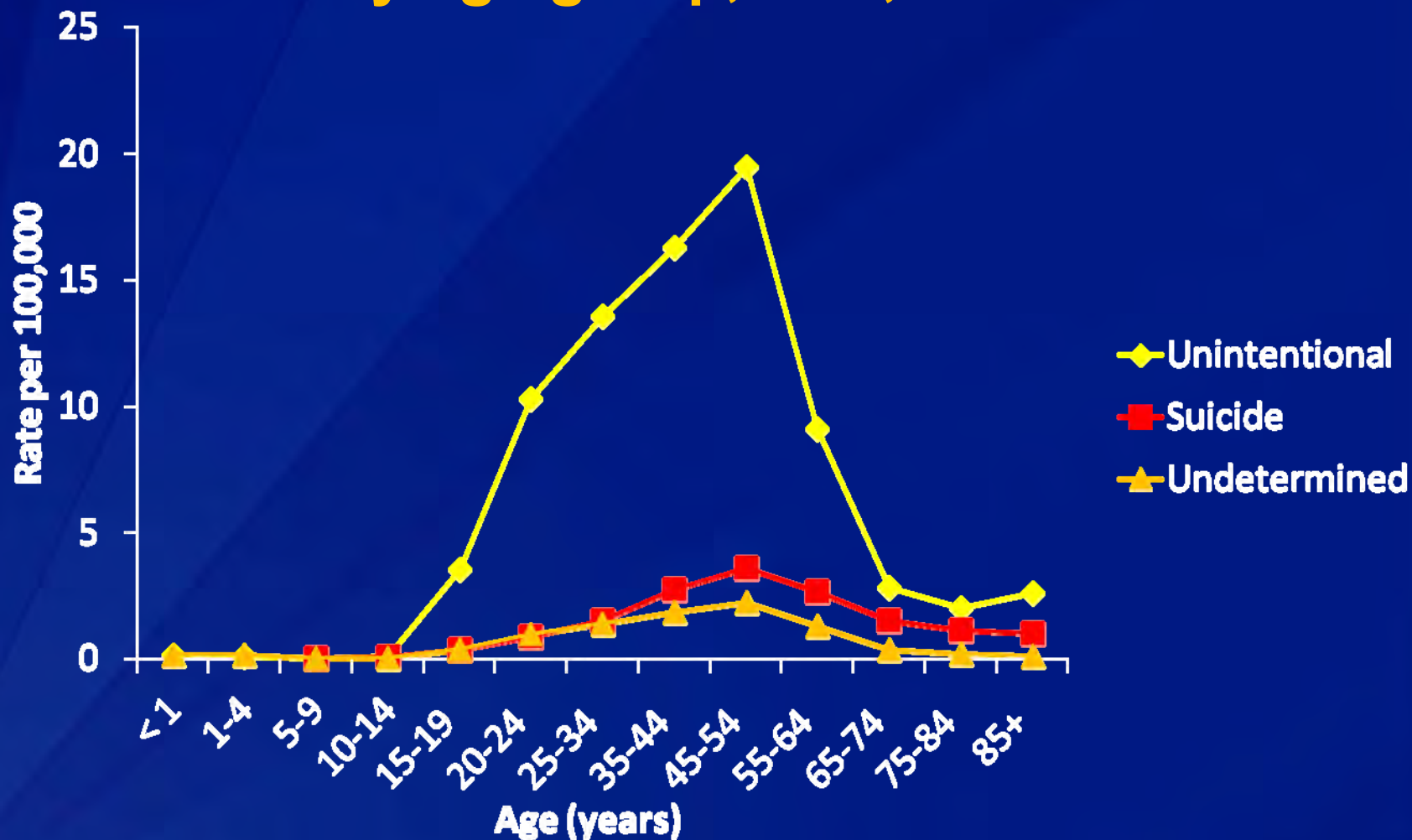
Prescription history as a risk

Drug overdose death rates by sex and drug type, U.S., 2008



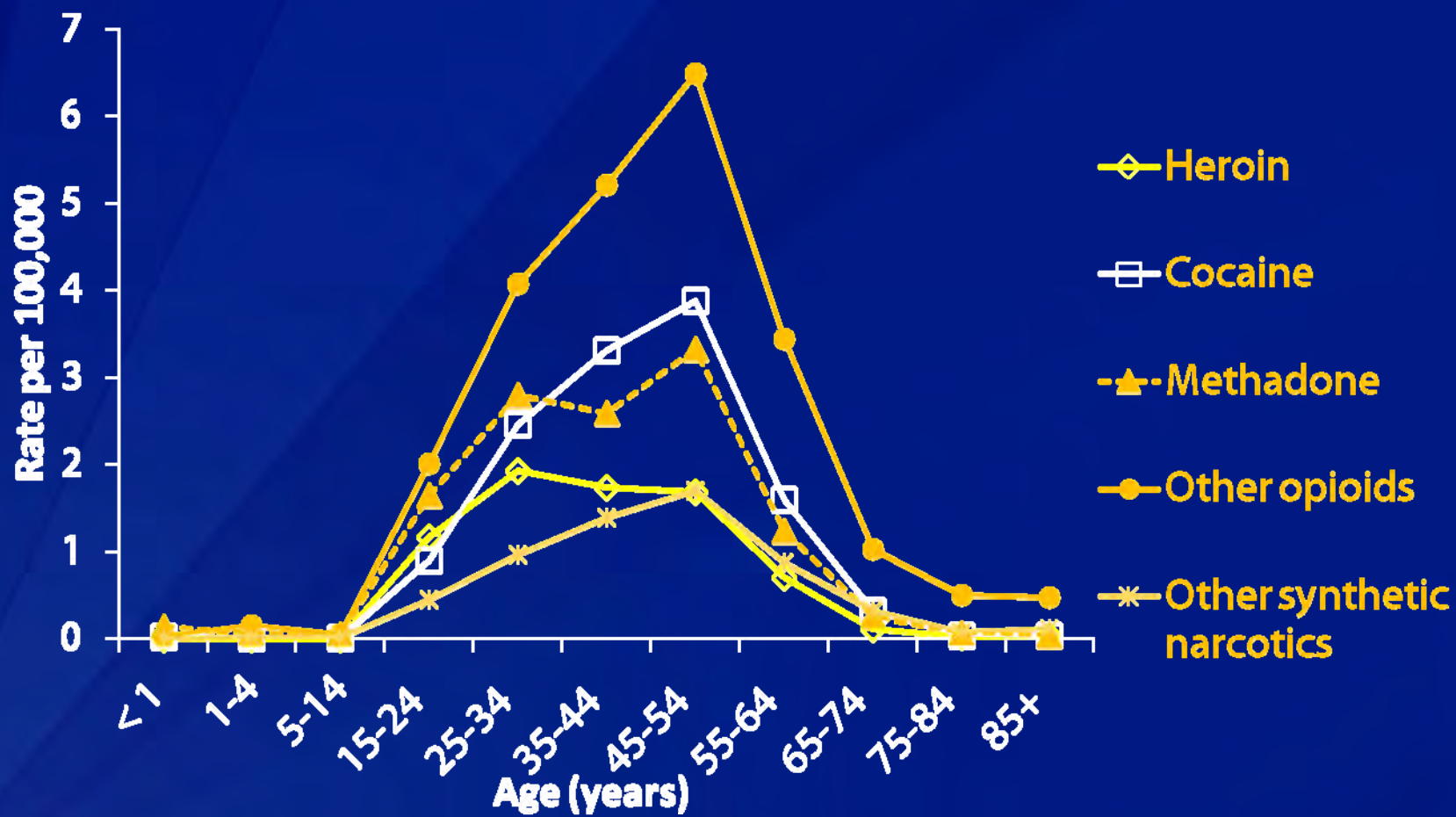
Source: National Vital Statistics System

Drug overdose death rates by intent by age group, U.S., 2008



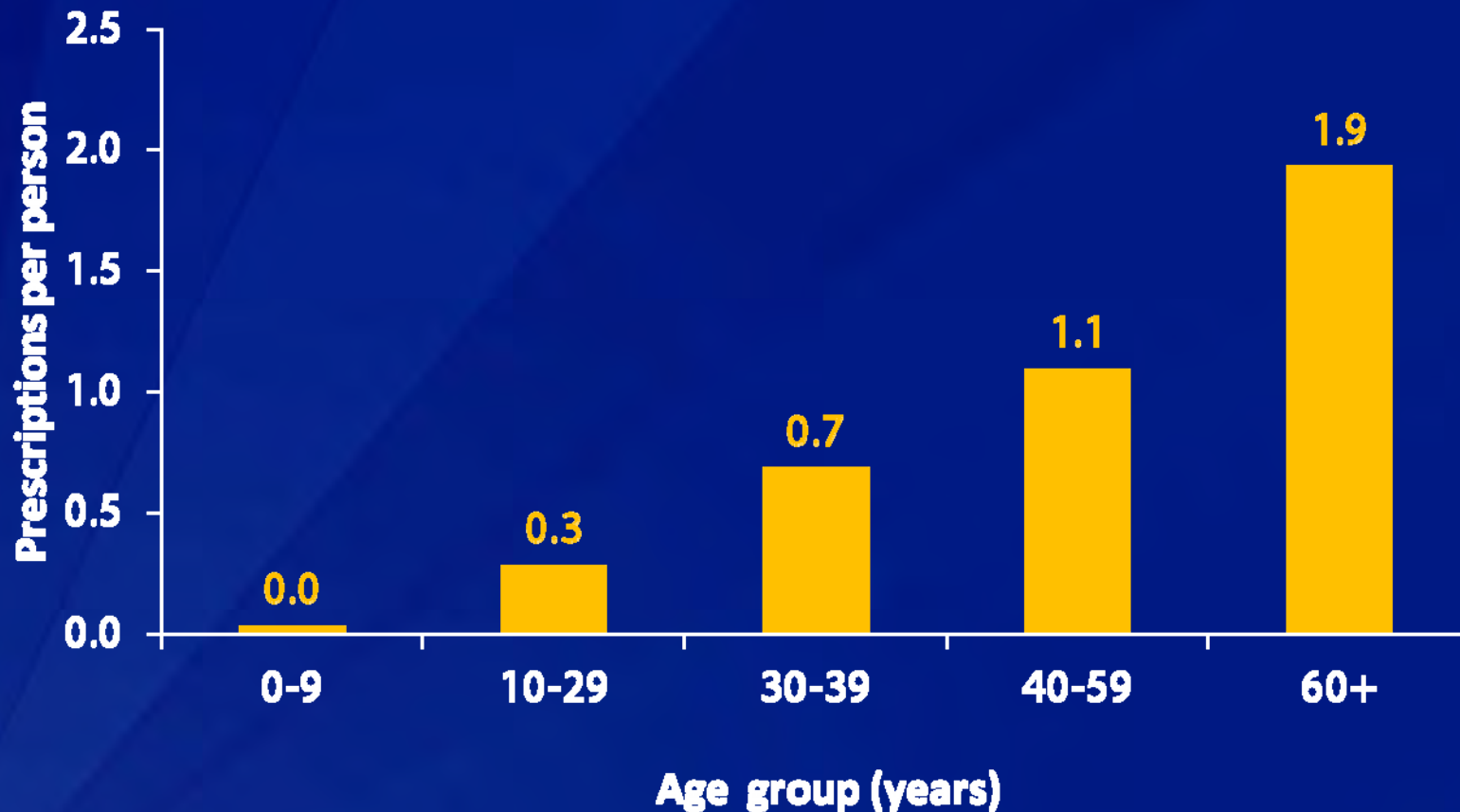
Source: National Vital Statistics System

Drug overdose death rates by drug type by age group, U.S., 2008



Source: National Vital Statistics System

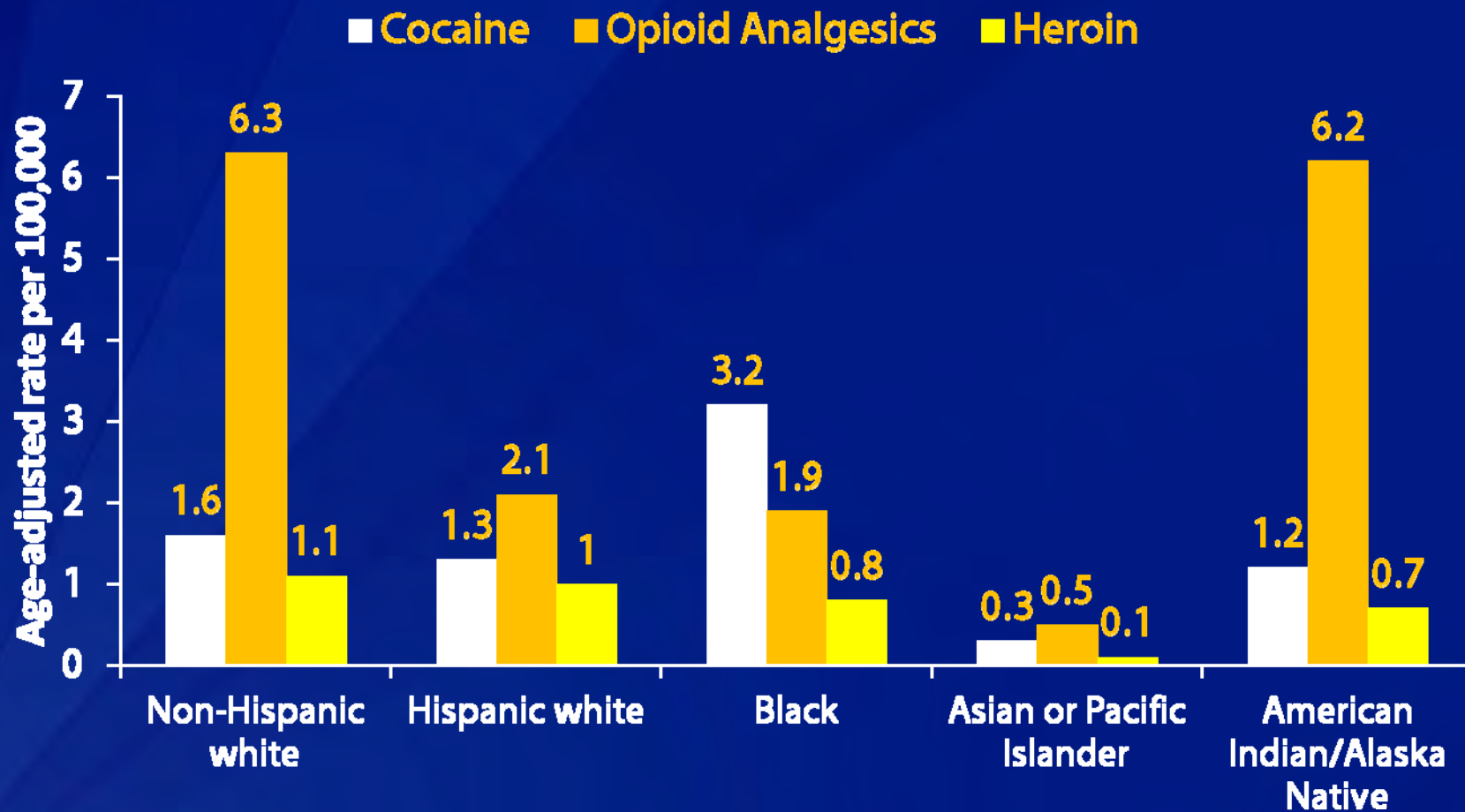
Opioid prescriptions per person by age group, U.S., 2009



Source: Volkow et al. JAMA 2011;305:1299-1301

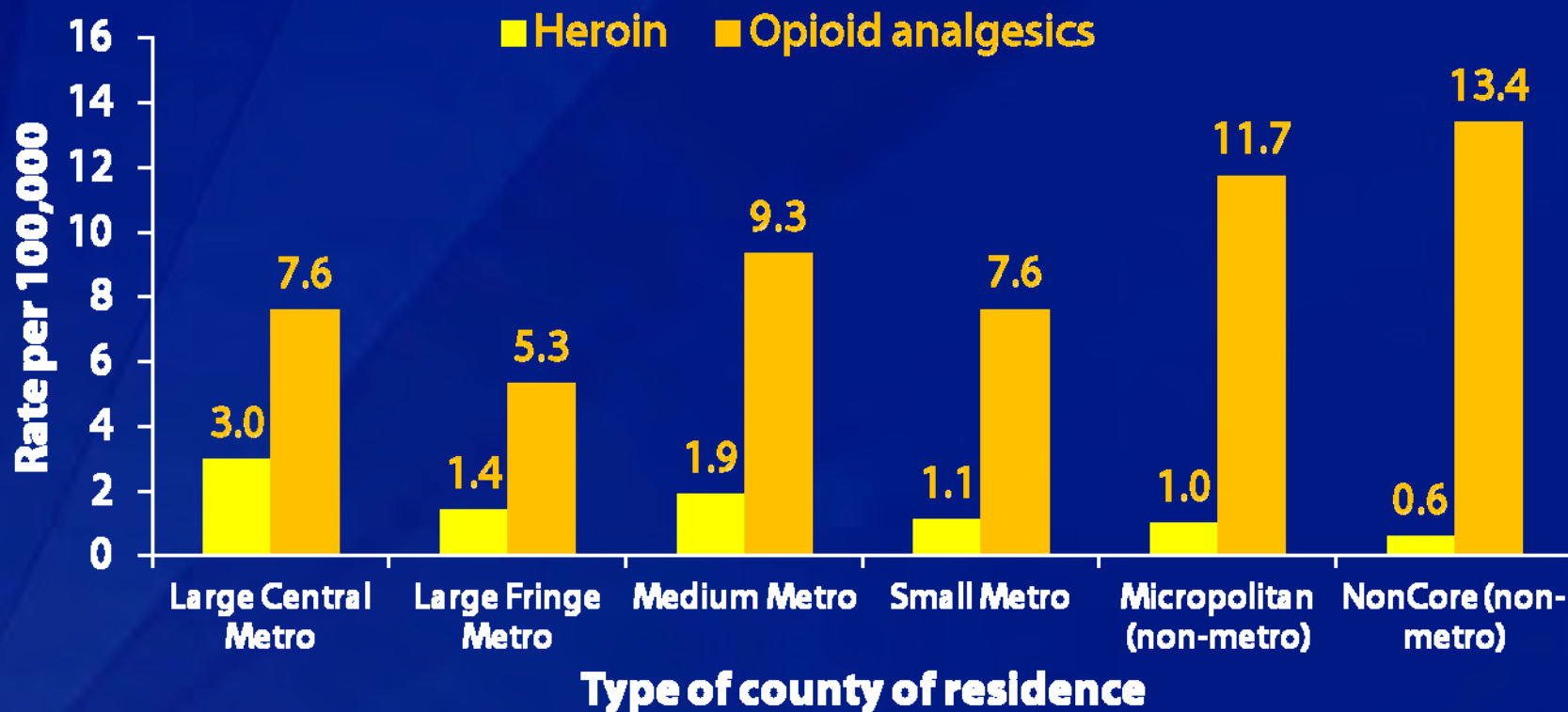


Drug overdose death rates by race/ethnicity and drug type, U.S., 2008



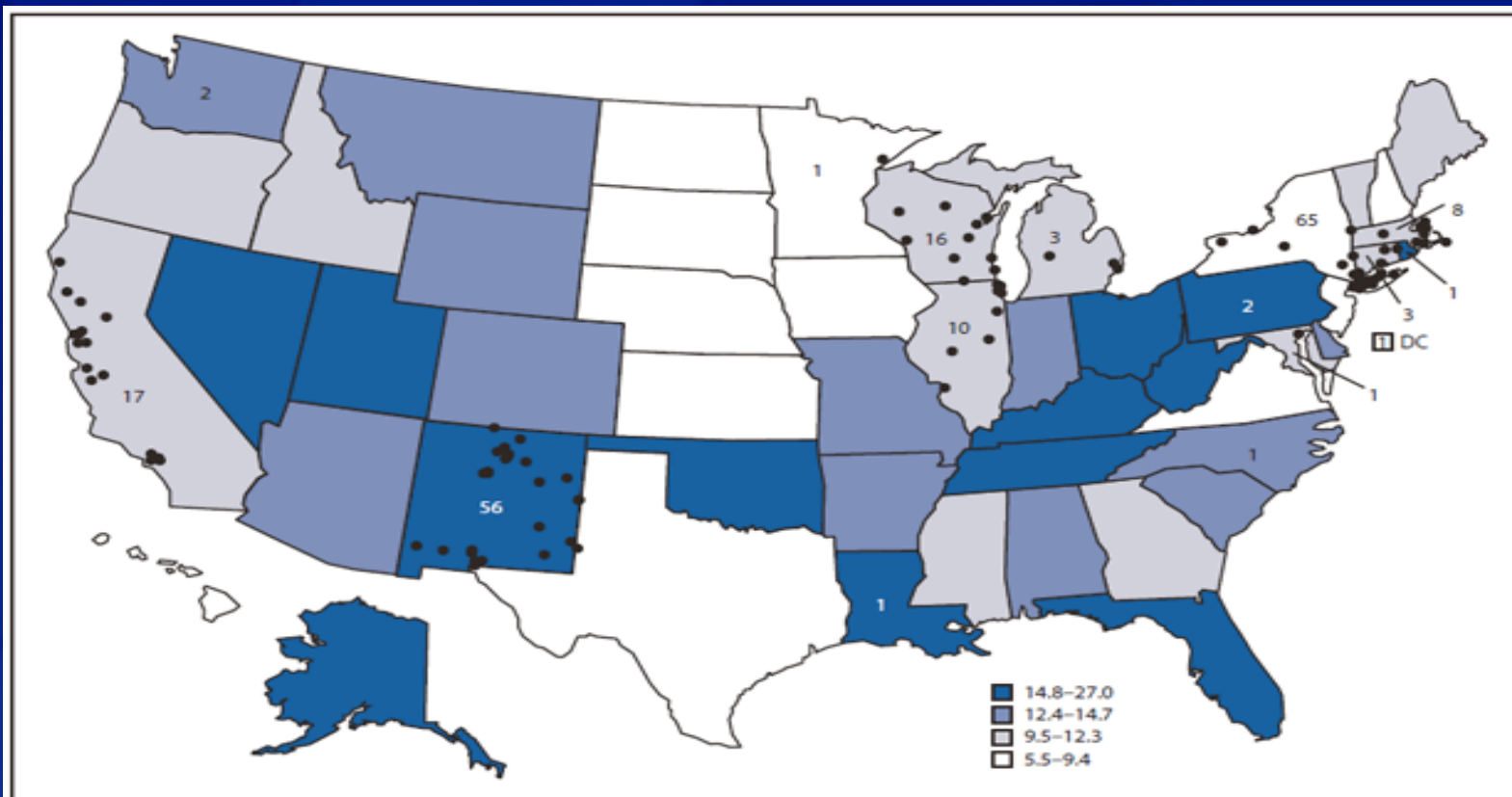
Source: National Vital Statistics System

Drug overdose death rates by urbanization and drug type, 16 states with centralized medical examiner systems, U.S. whites, 2008



Source: National Vital Statistics System

Drug overdose death rates[¶] in 2008 and number and location* of drug overdose prevention programs providing naloxone in 2010



Source: Wheeler et al, **Community-based opioid overdose prevention programs providing naloxone — United States, 2010**

MMWR 2012;61:101

[¶]Per 100,000 population. All intents included.

*Not shown in states with fewer than three local programs.

OVERVIEW OF PRESENTATION

Trends

Risk factors

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Other personal characteristics as risks

Prescription history as a risk



Characteristics of unintentional pharmaceutical overdose deaths (N=295), West Virginia, 2006

Characteristic	Pct.
History of substance abuse	78.3
Other mental illness	42.7
Nonmedical route of administration	22.4
Previous overdose	16.9
TOTAL	100.0

Sources: Hall et al, JAMA, 2008 and Toblin et al, J Clin Psych, 2010

Characteristics of unintentional prescription opioid overdose deaths (N=155), Utah, 2008-9

Characteristic	Pct.
History of substance abuse	60
Signs of nonmedical use (e.g., use without rx)	51
History of chronic pain	82
Mental illness diagnosed by a provider	57
TOTAL	100

Source: Presentation by WA Lanier at 2010 CDC EIS Conference, Atlanta, GA

Low income as risk for fatal prescription opioid overdose

Exposure	Referent	RR	(95% CI)	Source
Residence in a WV county with 22-39% of the population in poverty	Residence in a WV county with 9-16% of the population in poverty	2.1	(1.5-2.9)	Hall, 2008
Medicaid-enrolled WA residents	Non-Medicaid-enrolled WA residents	5.7	(5.3-6.1)	Coolen, 2009

Sources: Hall et al, JAMA, 2008;300:2613; Coolen et al, MMWR, 2009;58:1171-1175

Mental health problems as risks for opioid overdose (fatal or nonfatal)

Exposure	RR/HR	(95% CI)	Source
Substance abuse diagnosis in patients on chronic opioid therapy	2.6	Not provided	Dunn, 2010
Substance use disorder in chronic pain patients	2.5	(2.0-3.2)	Bohnert, 2011
Depression diagnosis in patients on chronic opioid therapy	3.1	Not provided	Dunn, 2010
Psychiatric disorders other than substance abuse in chronic pain patients	1.9	(1.5-2.4)	Bohnert, 2011

Dunn, Ann Intern Med 2010;152:85-92. Braden, Arch Intern Med 2010;170:1425. Bohnert, JAMA 2011;305:1315-1321.

Lack of prescription for involved drugs among unintentional pharmaceutical overdose deaths, various states

Type of Overdose Death	State/year	Pct w/o Rx
Pharmaceutical	WV 2006	63%
Prescription opioid	OH 2006-08	25%
Unintentional opioid	UT 2008-09	37%
Methadone in Medicaid population	NC 2007	74%
Methadone	OH 2006-08	71%

OVERVIEW OF PRESENTATION

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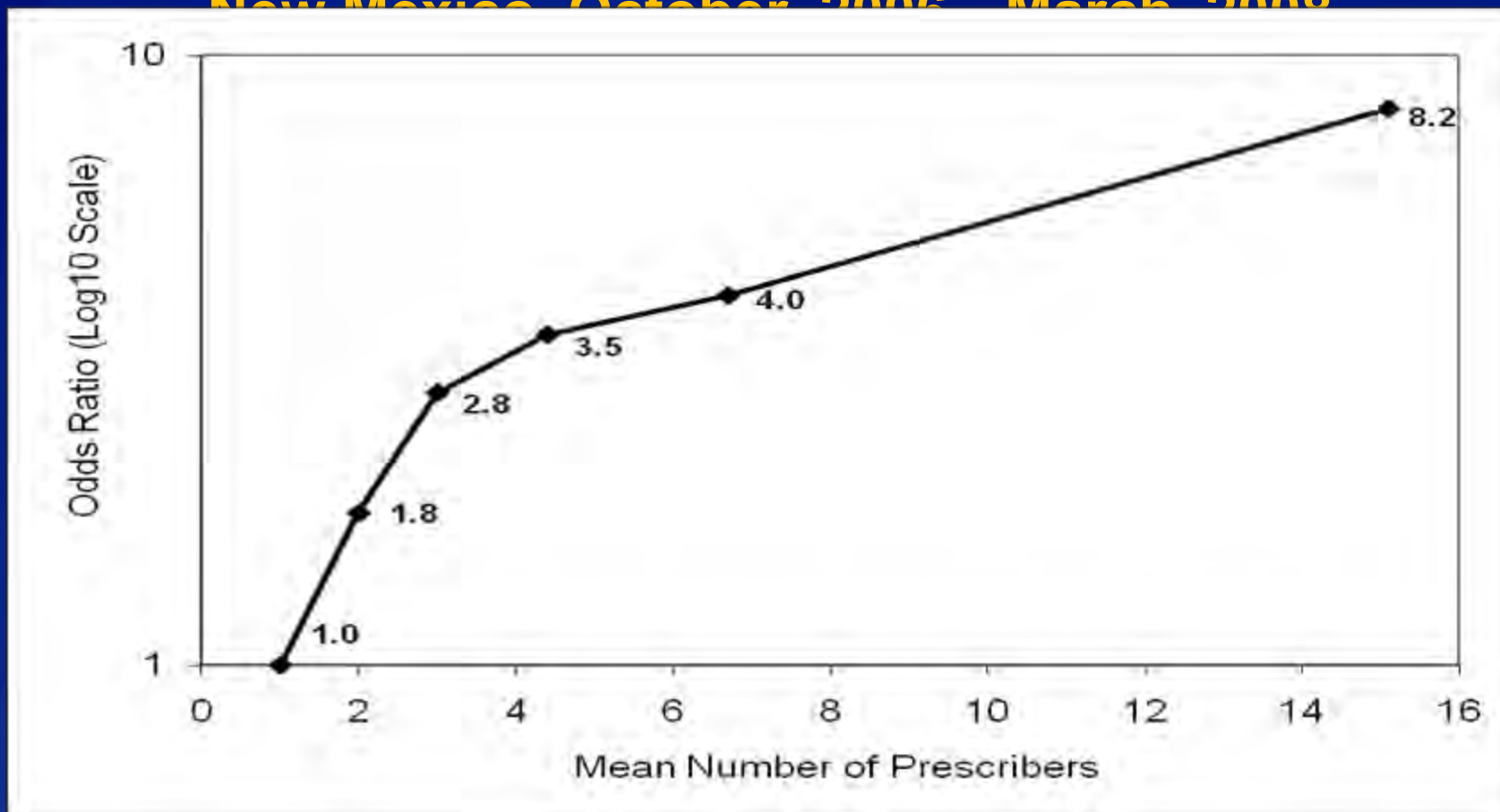
Use of multiple prescribers (“doctor shopping”) by people dying of prescription overdoses

Definition of doctor shopping	State Year	Pct.
Filled prescriptions from an average of five prescribers/year over 3 years (N=1,047)	Ohio 2006-08	16%
Filled prescriptions from 5+ prescribers in preceding year (N=295)	WV 2006	21%

Source: Ohio Department of Health at www.healthyohioprogram.org/diseaseprevention/dpoison/drugdata.aspx and Hall et al, JAMA, 2008 and Toblin et al, J Clin Psychiatry, 2010

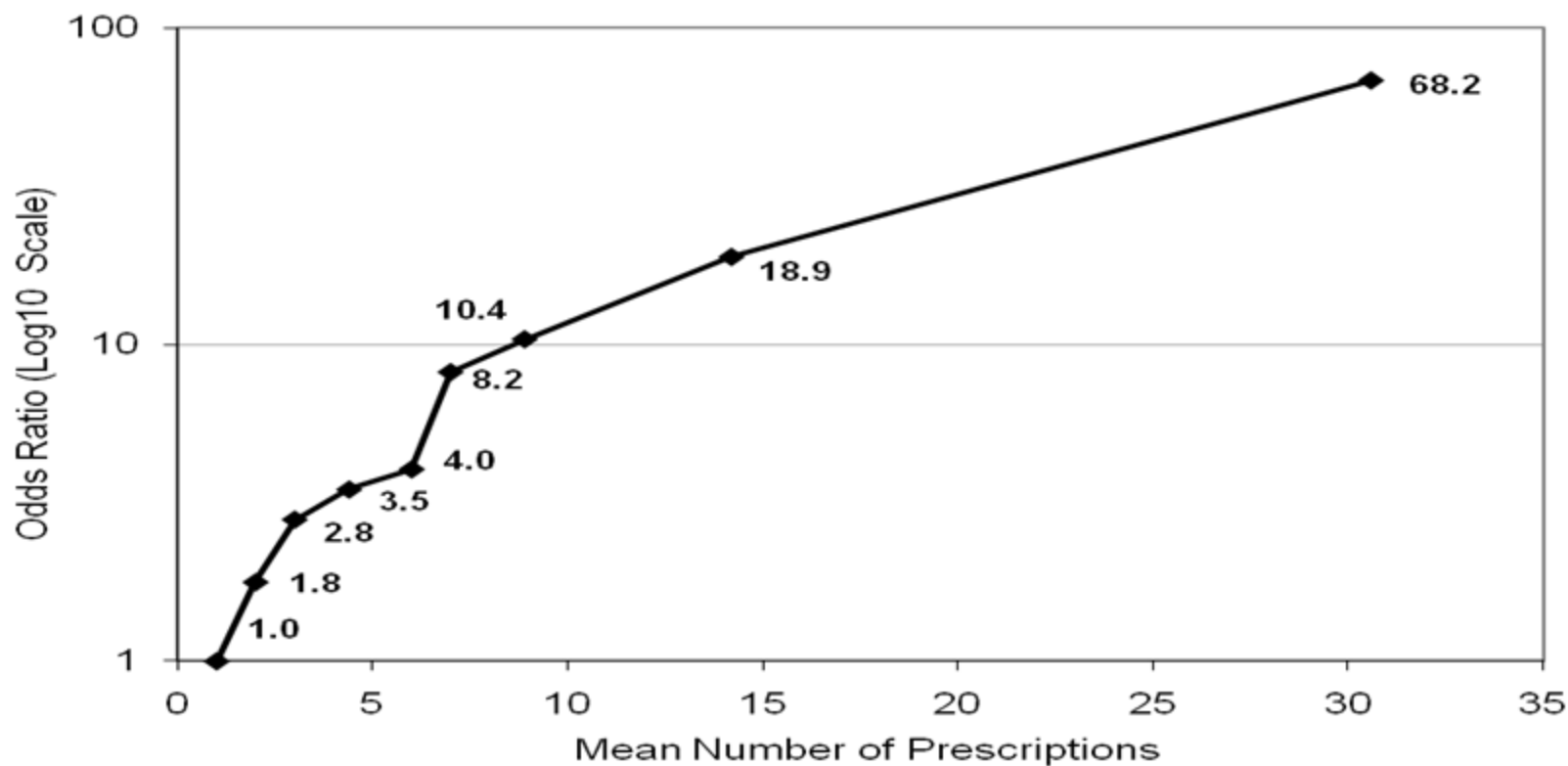
Crude association of number of prescribers per patient with risk of unintentional drug overdose death,

New Mexico, October 2006–March 2008



During six months prior to death. Source: Paulozzi, et al. Pain Med 2012; 13:87-95

Crude association of number of prescriptions for controlled substances per patient with risk of unintentional drug overdose death, New Mexico, October, 2006—March, 2008



During six months prior to death. Source: Paulozzi, et al. Pain Med 2012; 13:87-95

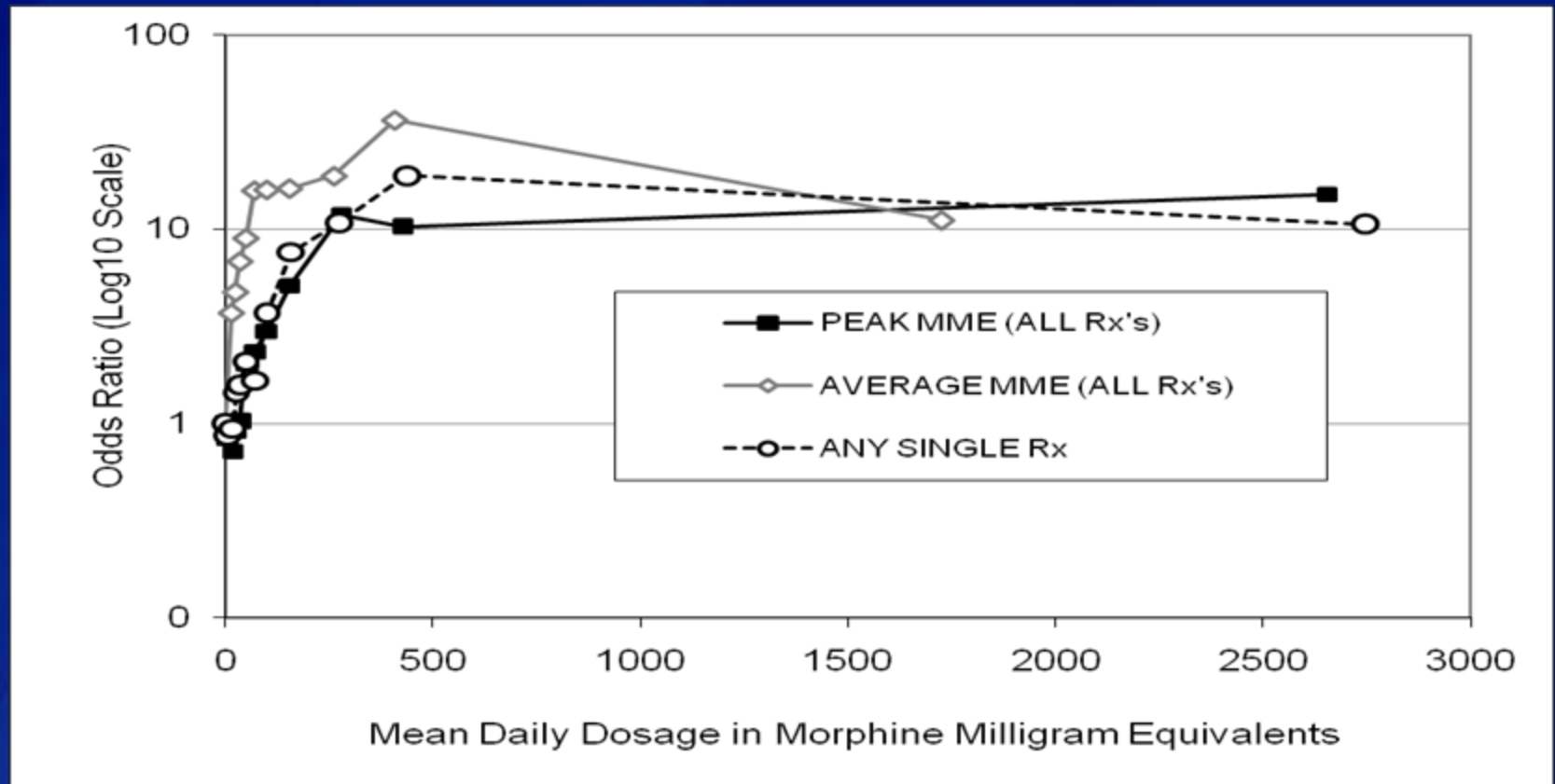
Daily dosage of opioid analgesic as risk for overdose

Exposure (morphine mg equivalents/day)	Referent exposure	RR/O R	(95% CI)	Source
≥ 100	No recent use	8.8	(3.4-19.7)	Dunn, 2010
>120	< Median	1.08	(1.02-1.1.15)	Braden, 2010
≥ 100	1- <20	7.18	(4.85-10.65)	Bohnert, 2011
>400	≤ 200	6.1	Not provided	Gomes, 2011
>120	≤ 120	7.6	(5.8-10.0)	Paulozzi, 2012

Dunn, Ann Intern Med 2010;152:85-92. Braden, Arch Intern Med 2010;170:1425. Bohnert, JAMA 2011;305:1315-1321. Gomes Open Med 2011;5:E20. Paulozzi, Pain Med 2012;13:87-95



Crude association of daily dosage of opioid analgesics with risk of unintentional drug overdose death, New Mexico, October, 2006—March, 2008



During six months prior to death. Source: Paulozzi, et al. Pain Med 2012; 13:87-95

Summary of potential markers for risk of opioid overdose

□ Demographic

- Male sex
- Age:
 - 45-54 years old (opioid analgesic)
 - 25-34 (heroin)
- Non-Hispanic white race
- Urbanization:
 - non-metro county (opioid analgesic)
 - metro county (heroin)
- Low income/Medicaid
- State of residence

□ Personal characteristics

- Substance abuse
- Other mental health diagnosis
- Nonmedical use of prescription
- Route of administration

□ Prescription history

- Multiple prescriptions
- Multiple prescribers
- High daily dosage

Thank you

- ❑ **The findings and conclusions in this report are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention**

ALARMINGLY HIGH:

Prescription Drug Abuse and the Pill Pipeline in Appalachia

ROBERT P. PACK



Over the past decade, prescription drug abuse has cut a destructive path through Appalachia. I've been a close witness to that destruction. I've seen friends and acquaintances struggle and die, youth and young adults turn to theft and prostitution, families weakened and destroyed, and whole towns transformed because of crime and violence.

One spring afternoon in 2002, I drove to Richwood, West Virginia, to do a focus group with teachers and community leaders on inhalant abuse—the huffing of gas, paint, and solvents to get high. I was a professor at the West Virginia University School of Medicine, and I had chosen to study inhalant abuse since West Virginia had the highest rate of youth “huffing” in the nation, about 40 percent above the national average. Over the course of the afternoon, the group provided some polite interest and some pretty good answers to my questions. All was going well, and I was going on about the risks and long-term consequences of huffing when one of the participants raised his hand and said, “You know, huffing paint and gas is a problem for a few kids around here. I have known one or two that had that problem. But, if you really want to help, you’ll come to the local Narcotics Anonymous meeting with us this evening and hear about our real problem.”

And so I went. At that meeting I heard stories that defy logic, tradition, culture, stereotypes, and sanity. Stories of housewives selling everything they own, including their bodies; stories of rural kingpins, invisible networks, and trips to Florida, Mexico, and

Baltimore; and stories of friends and acquaintances whose lives ended tragically.

I spent the two-hour drive back to Morgantown that night in silence. If what they said was happening in their community was true, then we had a coming storm on our hands.

Truth be told, the storm was already raging. On the national level, celebrity pill addiction and overdose were beginning to be popular news stories. But our Appalachian story was altogether different. I started paying attention to the news in our region and started seeing dozens of articles about pill diversion, pharmacy theft, and overdoses. Meanwhile, my childhood friend, with whom I kept up regularly on the phone and with whom I visited frequently when home, dropped the bomb that he had a serious problem and needed help.

We started spending more time on the phone. Indeed, over the next few years we would spend dozens of nights talking about his addiction, and it was a shocking education for me. My friend had become a full-time doctor shopper and pill trader. He had an enormous physiologic need for pills, taking at least sixty a day, in carefully regimented sequences, to offset or enhance effects and side-effects. He was brilliant, and he was desperate. We talked about treatment and counseling. We talked about the effect his addiction was having on his family. We talked about risks and desperation. In retrospect, I wish I had driven to his house, put him in the car, and gone with him to the hospital myself. I didn’t hear from him for several weeks, and I assumed all was going well after a recent

Photo courtesy Charlie Warden.

commitment to sobriety. When I got the call . . . and my father told me he had died, my academic curiosity instantly became a personal mission.

Epidemiology

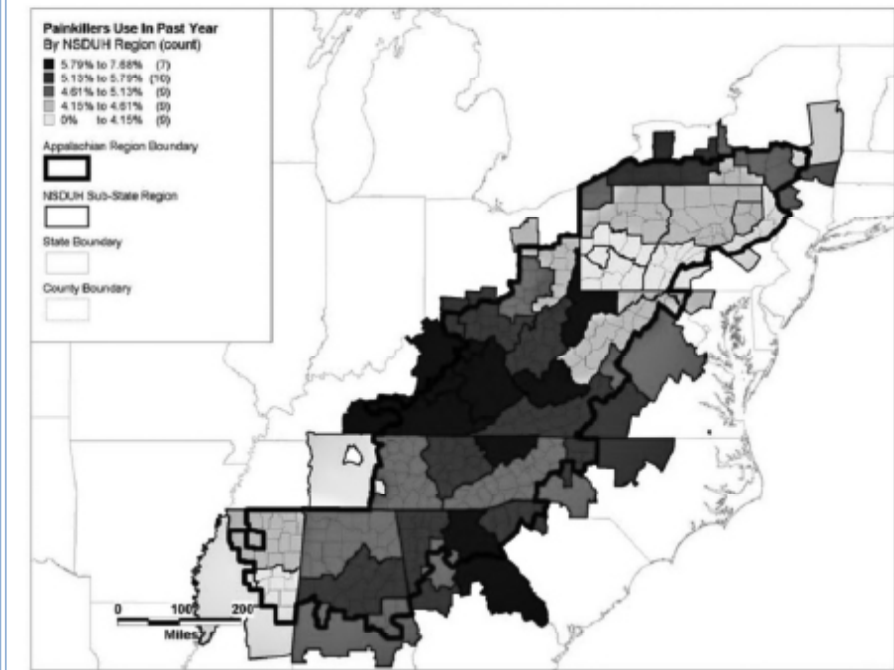
According to the National Household Survey of Drug Use and Health, more than 30 million Americans have abused prescription pills in their lifetime, about 15 million have done so in the past year, and about 7 million are current, past-month abusers. Pills are the second most frequent “new” substance adults choose when they use drugs illicitly. They are the first most frequent new substance for youth. While the use of other drugs like marijuana and cocaine has decreased or stayed the same, illicit use of pills has increased by at least 30 percent in the past decade. The most frequently abused are pain pills such as oxycodone and hydrocodone, followed by sedatives, stimulants, and tranquilizers. Other regions of the country suffer from the same problem, to be sure; however, pill abuse is more prevalent in rural areas and in areas where there is more poverty and unemployment.

In one study of the problem in Appalachia, funded by the Appalachian Regional Commission (ARC) and performed by the National Opinion Research Center and East Tennessee State University, about 22,000 of the 19.4 million residents of the region were surveyed about their drug use. Researchers found that the region is consistent with the rest of the country in the misuse of pills: 5.6 and 5.9 percent respectively. But the Central and Southern Appalachian areas are higher: 6.4 and 6.2 percent respectively. Pockets of the region are incredibly hard-hit—especially coal-mining country (Figure 1). Rates of painkiller abuse in coal-mining regions approach 7.7 percent, and treatment rates for opiates are higher than the rest of the nation. Heroin use is presently lower than the rest of the country, but it is rising, specifically in coal-mining areas. While the phrase “Hillbilly Heroin” is used to describe OxyContin, Appalachia is increasingly having to contend with the real thing.

Admission to treatment from 2000 to 2004 for heroin abuse in people age twelve and older showed

a steady decline nationally, dropping from 15 percent to 14 percent. However, treatment centers in Appalachia reported a steady increase in heroin treatment admissions from 4 percent to nearly 10 percent over the same period.

Map 2.19 Painkiller Use in Past Year, by NSDUH Sub-Region, 2002-2005



One reason is cost. Prescription drugs run between fifty cents and one dollar per milligram, for pills ranging from two to eighty milligrams per dose, whereas heroin is five dollars to ten dollars per dose, depending on its quality and the local market. A recent report in the *Los Angeles Times* indicated that black tar heroin syndicates seek out areas of the country where the pill problem is greatest and therefore have the highest capacity for heroin market growth. One method used by the heroin dealers is to find the local Suboxone or methadone clinics and approach the clientele as they enter and exit.

Most alarming is the fact that youth perceive prescription drugs to be much safer than other forms of drugs. For example, according to the Partnership for a Drug-Free America, about 40 percent of youth think prescription pills are safer than “illegal” drugs, and about 30 percent find nothing wrong with using prescription pills to get high. Each day, over 2,500 youth try prescription drugs for non-medical reasons for the first time. The National Institute on Drug Abuse estimates that in 2005, annual abuse of Vicodin was 9.5 percent among high school seniors, making it the most commonly abused drug by that age group. Additionally, OxyContin use has

significantly increased among high school seniors since 2001. The ARC-funded study shows that Appalachian adolescents have a proportionally higher reported rate (10.6 percent) of pill abuse than their counterparts in the rest of the U.S. (8.7 percent).

In a 2008 article in the *Journal of the American Medical Association*, Aron Hall and colleagues report a 550 percent increase in overdose deaths in West Virginia from 2002 to 2006. Their comprehensive review of death records revealed that pharmaceutical diversion (prescription drugs obtained illegally using a variety of methods, including theft, deception, and trade) was associated with 63 percent of deaths, and “doctor shopping” (going to multiple doctors to seek pills) was implicated in more than 20 percent of the cases. The authors also found that 93 percent of those who died had used prescription opioids, and 40 percent had taken methadone, a synthetic, often-abused opioid employed in the treatment of drug addiction. Only 44 percent had a prescription for the drugs they used.

We know where the pills come from—the supply side of the dilemma. They follow a clearly defined and regulated path from manufacturer to shelf. It would seem, then, that the problem could be corrected by clamping down on doctors and pharmacists, training them well, and making sure there is a good system in place to monitor prescriptions and their delivery. Regrettably, it is not that easy.

Around 2001 state-level Prescription Monitoring Programs (PMPs) began emerging in the fight against pill abuse. The presence of a state PMP was touted as a deterrent to diversion. Now, over thirty states have them, and they are providing good information. For example, we know that in 2008 more than 272 million hydrocodone pills were prescribed in Tennessee. That equates to 43.87 pills for each of the state’s 6.2 million residents. We also know that it takes several minutes for a provider to get online and double-check the history of a patient suspected of angling for an illegitimate prescription.

If a provider is legitimate and the attempt to obtain an illegitimate prescription is careful, some pills will wind up in the wrong hands. But the market for pills is not being satisfied by “unwitting” physicians or even a few sloppy clinical care providers. Many pills do come from rogue physicians or “candy-man” doctors, but casual abusers of pain pills acquire most

of their pills from friends or family. Only after a person is pretty highly addicted does he or she begin going to the “candy-man” doctors or the streets. In one survey, more than 58 percent of respondents reported getting prescription drugs from friends or family, and only about 7 percent said they obtained pills from “doctor shopping” or the streets. About 14 percent of callers to the West Virginia Quitline, arguably a more addicted clientele, reported getting their drugs from “doctor shopping” at least sometimes. In the Hall study, some 21 percent of the people who died from overdoses had been “doctor shoppers.” Clearly, as the addiction progresses, the propensity to spend time acquiring the drugs intensifies.

Authorities believe most of the pills now on the street in Appalachia have come up the “pill pipeline” from pain clinics in Florida, resulting in an increase in street-level availability.

What to do

Prevention of diversion and treatment for pill addiction are desperately needed, but local efforts should be focused on prevention of pill abuse, beginning in the home: Educate yourself about the type of pills you and your family have been prescribed; monitor the exact number of pills that have a psychoactive effect (including pain pills with hydrocodone and oxycodone, sedatives, stimulants, tranquilizers, and many others); secure such pills with lockboxes; and if you have older pills that are potentially risky, put them in an old peanut butter jar, tape the lid shut with duct tape, and put them inside a bag in the trash. Do not flush them down the toilet, since they can wind up in the drinking water down the river or in the water table. Occasionally, pharmacies will hold pill drop-off days when you can dispose of them properly.

In your community, counsel people to monitor their prescription drugs, secure those drugs, and carefully dispose of unused doses. Encourage doctors to use prescription monitoring software. Engage in conversation with friends and family to dispel the myth that prescription drug misuse is safe.

Such measures are necessary to combat the threat that prescription drug abuse poses to our heritage, our culture, and our way of life in Appalachia. ❖

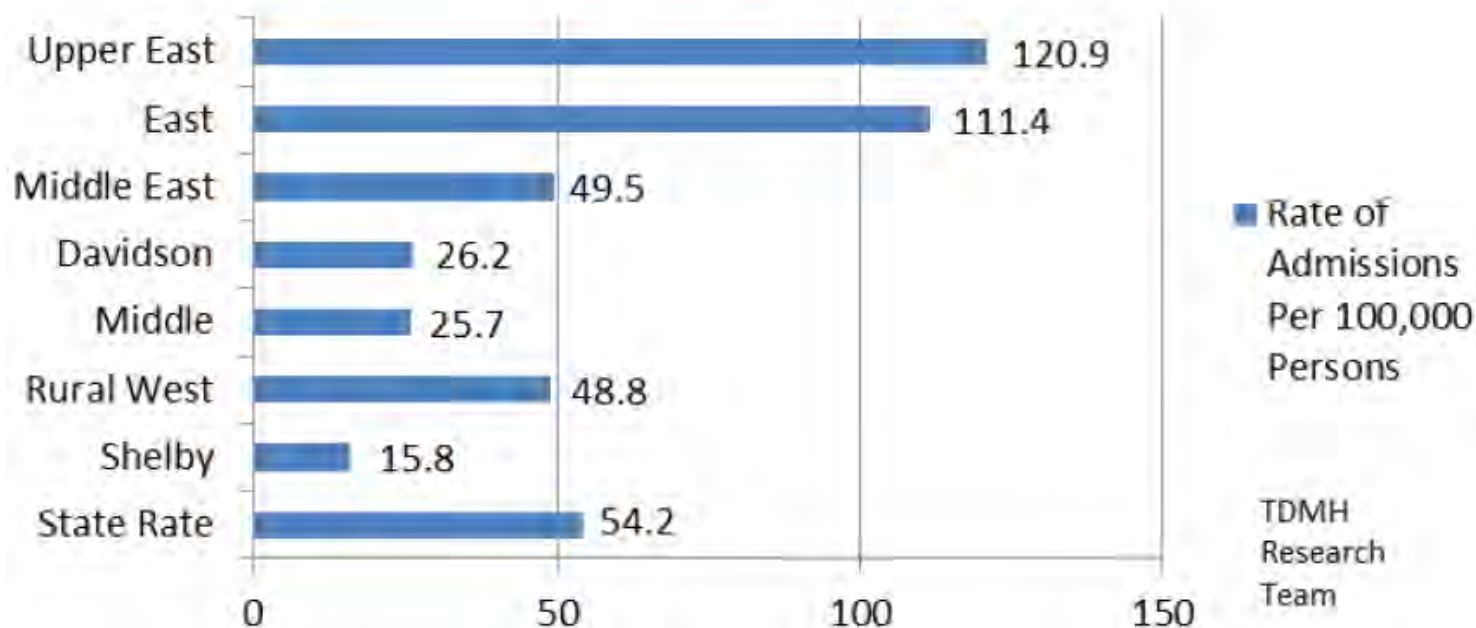
“Prescription Drug Epidemic” - Epidemic in the US Tennessee Among the Highest Abuse Rates in US Northeast TN Among Highest Abuse Rates in State

- Tennessee is the 2nd leading state in regards to pounds of opiate pain reliever drug sold.
- Prescription opioids ranked #1 abused drug among individuals receiving state-funded treatment services. This increased from 416 in 2000 to 3,331 in 2010—nearly a ten-fold increase.
- Tennessee has one of the highest rates of prescription drug abuse in the nation
- Drug overdose deaths in 2010 represents an increase of 250% over the 10 year time period.
- 51 pills of hydrocodone for EVERY Tennessean above the age of 12 ; 21 pills of oxycodone
- Opioid abuse in Tennessee is greater than abuse of marijuana or crack/cocaine
- Percentage Tennessee children entering custody with related substance abuse problem from 19% to 33%.
- Estimated costs of caring for these children increased from \$29 million to over \$52 million.
- The Prescription Drug Epidemic is “Especially Painful to Tennessee”—Comm. D. Varney.
- 1,062 people died from drug overdoses in TN in 2011. A 140% increase in ten years. High tan auto deaths
- Abuse Rates in East Tennessee are double the rest of the state.
- East Tennessee has more than 50% higher rates of opiate-addicted pregnant women.

Sources: State of Tennessee Health Plan 2012; TDMHSAS Commissioner E. Douglas Varney, Governor’s Safety Forum Presentation, Governor’s Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012.

Abuse Rates in East Tennessee are Double the Rest of the State.

Persons Admitted to State-Funded Treatment for Opioid Abuse in Tennessee (Rate Per 100,000 Persons): Fiscal Year 2011



Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012.

Treatment Options

- **Abstinence-based**
- **Buprenorphine-based in a physician's office**
- **OTPs (first 2 plus methadone)**

Treatment Options

- **Abstinence-based**
- **Buprenorphine-based**
- **OTPs (first 2 plus methadone)**

**Addiction
Severity**



How to Treat NE Tennessee's Alarming Problem of Opiate-Addicted Pregnant Women?

Treatment

- Abstinence-based
- Buprenorphine-based
- OTPs (first 2 plus methadone)

Comments

ACOG: Risk of fetal demise

MSHA: Stop; this is not safe for the mother or unborn baby

ACOG, MSHA, CDC, NIH, HHS, NIDA, SAMHSA, ASAM, AMA, NEJM: Methadone is the Standard of Care

The Standard of Care for Opiate Addiction is Methadone Maintenance Treatment

**METHADONE HAS BEEN ENDORSED AS THE “STANDARD OF CARE” FOR
OPIATE ADDICTION – AND ESPECIALLY FOR PREGNANT WOMEN – BY:**

NATIONAL INSTITUTE OF HEALTH (NIH)

NATIONAL INSTITUTE ON DRUG ABUSE (NIDA)

U.S. SUBSTANCE ABUSE & MENTAL HEALTH SERVICES ADMINISTRATION (SAMHSA)

AMERICAN SOCIETY OF ADDICTION MEDICINE

CENTER FOR DISEASE CONTROL (CDC)

WORLD HEALTH ORGANIZATION (WHO)

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS)

AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS (ACOG)

NEW ENGLAND JOURNAL OF MEDICINE

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (AMA)

Source: National Institute of Health (NIH.gov); National Institute on Drug Abuse (NIDA.gov). 2; U.S. Substance Abuse & Mental Health Services Administration (SAMHSA.gov); Center for Disease Control (www.cdc.gov); The World Health Organization (WHO.org); The New England Journal of Medicine (JAMAnetwork.org); Journal of the American Medical Association (AMA-assn.org); American College of Obstetricians and Gynecologists (acog.org).

Methadone is the Standard of Care with Opiate-Addicted Pregnant Women

"Opioid use is not uncommon in pregnancy. The current standard of care for pregnant women with opioid dependence is referral for opioid-assisted therapy with methadone."

"Abrupt discontinuation of opioids in an opioid-dependent pregnant woman can result in preterm labor, fetal distress, or fetal [death]."

American College of Obstetricians and Gynecologists (2012).

"Methadone is the recommended treatment for opioid dependence during pregnancy."

Journal of the American Medical Association, April 30, 2012.

"The standard of care for opiate addiction during pregnancy is methadone maintenance and psychiatric care."

New England Journal of Medicine 363;24 (nejm.org) December 9, 2010.

"Methadone is the standard of care in pregnant women with opioid addiction."

National Institute of Health (NIH) Consensus Panel (1998)

"Methadone has been the standard of care for the past 40 years for opioid-dependent pregnant women."⁵

National Institute on Drug Abuse (2012).

Source: 1. American College of Obstetricians and Gynecologists (2012). 2 3. 4. National Institute of Health (NIH) Consensus Panel (1998). 5. National Institute on Drug Abuse (2012).

Mountain States Warned of Risks of Methadone Substitutes in 2012

“If you are pregnant, trying to get pregnant or not using birth control, don’t take Subutex or Suboxone, for the sake of your unborn child.”

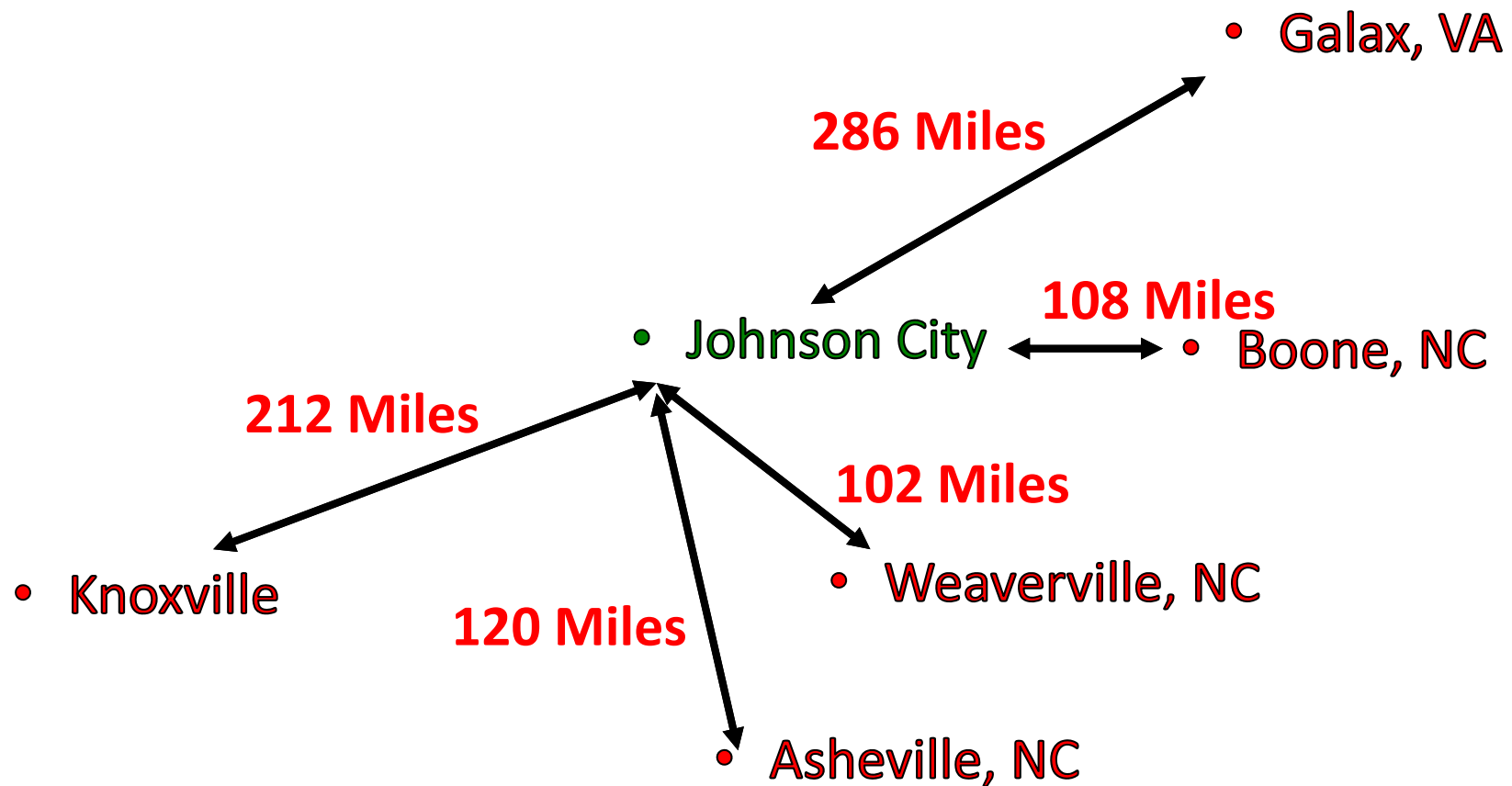
“And if you are a physician, don’t continue to prescribe those drugs containing buprenorphine to anyone who is pregnant.”

“Dr. Joy Anderson, a Mountain States Medical Group obstetrician and gynecologist practicing in Kingsport, said pregnant women are being told by physicians prescribing the two drugs ‘it’s a safe drug in pregnancy’ when it is not.”

“Methadone is the recommended medication used for detoxification during pregnancy, the MSHA literature says.”

Source: “Women Warned Not to Take Two Drugs Around Pregnancy”, Johnson City Press, March 22, 2012. (<http://www.johnsoncitypress.com/article/99175>)

Where do people in the Tri-Cities area go for Standard of Care Treatment?



Need

<u>State</u>	<u>NE Tennesseans</u>	<u>Comments</u>
• Virginia	50	
• North Carolina	400	Conservative
• Knoxville and Nashville	187	2008
Subtotal	637	Conservative; Big program
2-3 that won't make trek	1,274 – 1,911	
<u>Total</u>	<u>1,911 – 2,548</u>	

Subject: Approximate Total Patient Count of Tennessee Residents Being Served in NC OTPs in May, 2013
Date: 6/24/13 11:49:23 AM
From: "Clark, Spencer"
To: "'kostertag@charter.net'"
Cc: "Bowman, Jennifer" , "Vanwy, Dolly" , "Worth, Smith" , "Davis, Brenda"

Slide 11

Kathy:

Our approximate total patient count of Tennessee residents being served in NC OTPs in May, 2013 is at least 400 unduplicated individuals.

The final figure may be higher than this as we have not yet received data from a survey of all of our programs.

Please do not hesitate to contact us if you have further questions.

Spencer Clark, Administrator
NC State Opioid Treatment Authority

Spencer Clark, MSW, ACSW
NC Department of Health and Human Services
Director of Operations and Clinical Services
Community Policy Management Section
Division of Mental Health, Developmental Disabilities and Substance Abuse Services
3007 Mail Service Center, Raleigh, NC 27699-3007
Telephone: (919) 733-4670 Fax: (919) 233-4556
Spencer.Clark@dhhs.nc.gov
<http://www.ncdhhs.gov/mhddsas/>

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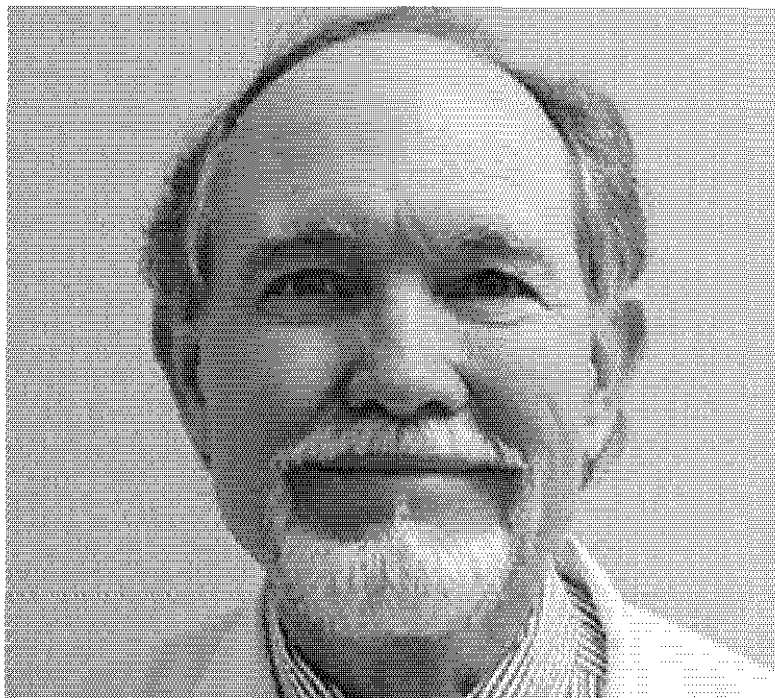
Version: 2013.0.3345 / Virus Database: 519976438 - Release Date: 06/24/13

Need



Tri-Cities Will Operate in The Most Heavily Regulated Healthcare Environment in the U.S.

- **OTPs are regulated at the Federal and State level, and accredited by thorough standards by CARF (Commission on Accreditation of Rehabilitation Facilities) and JACO**
- **All staff qualifications and required on-site time are strictly regulated**
- **The center will adhere to strict guidelines on counseling, diversion control, and testing for HIV, TB, hepatitis, etc.**
- **These centers have very few operating degrees of freedom**





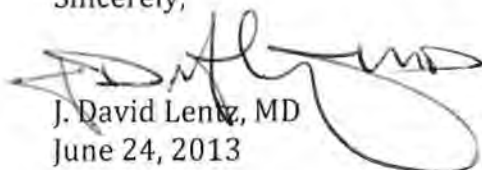
My name is Doctor J. David Lentz, and I am speaking in favor of the applicant. I wanted to be here in person to deliver this message, but I have had unexpected patient demands that have kept me in the office.

I have practiced medicine for 38 years, including addiction medicine, and especially treating opiate addicts. I have also served in the United States Navy. Currently I am the Medical Director of one of the clinics Mr. Kester started, where I have worked for six years. I am also a private practice physician certified to prescribe buprenorphine. Here is what I would like you to know:

- Having worked across the treatment spectrum for opiate addiction, I can see where people would have different opinions on treatment options, but I can't understand a medical argument for not allowing access to all options, especially the one with the longest and best track record of success.
- I have known Mr. Kester for over 10 years, and have worked for two of his companies. I also know him as a neighbor, friend and committed family man. I can say unequivocally that Mr. Kester conducts himself to the highest professional standards I have seen in the medical industry. The success of his centers resulted because we treat patients with the highest respect in the business. Most of the patients that come to us transfer from other programs. They have a choice, and they chose Mr. Kester's clinics. We have achieved the highest growth in the industry because we treat patients the best.
- I also know first-hand the investment Mr. Kester has made in the community. His generous donations have hosted orphans and built churches, schools, and youth athletic programs.
- If anybody tries to undermine Mr. Kester's integrity, passion for care, generosity in the community or the centers he co-founded, they are simply wrong.
- I have no financial interest in Tri-Cities Holdings, and I have not been compensated for my testimony.

Should you have any questions regarding my testimony, please feel free to give me a call.

Sincerely,


J. David Lentz, MD
June 24, 2013

715 Village Square Drive, Stone Mountain, GA 30083 • (404) 299-8444
2121 Fountain Drive, Suite A, Snellville, GA 30078 • (770) 736-3008

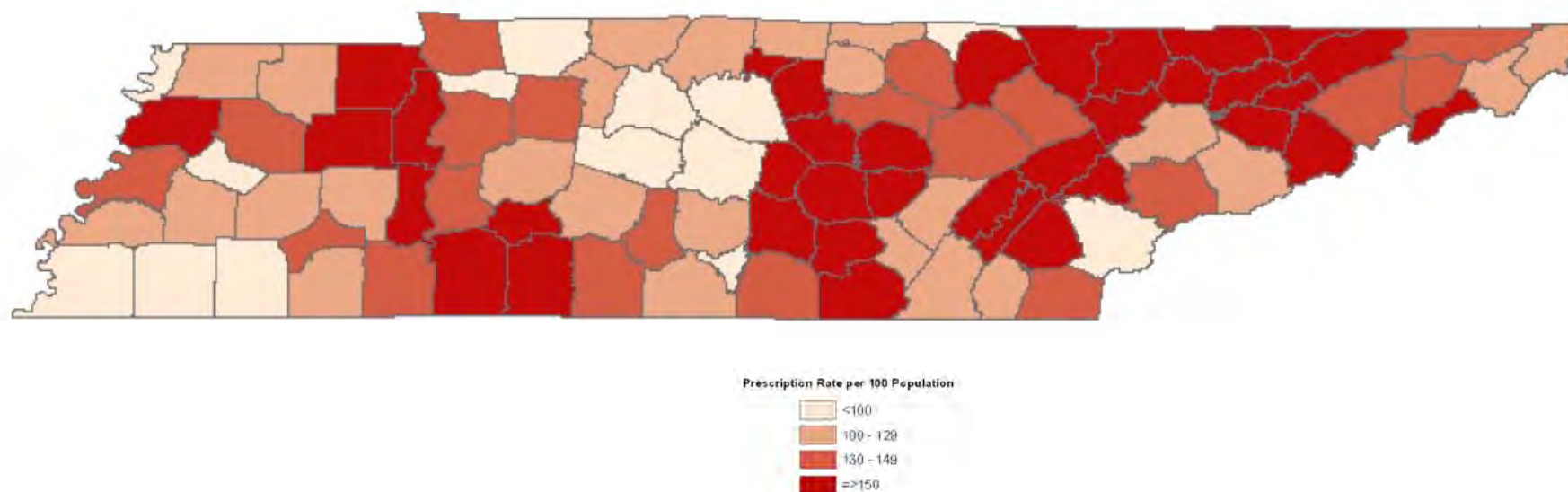
Tennessee Drug Overdose Death Toll Exceeds Iraq and Afghanistan Wars

	Total Deaths Since 2003	Deaths Most Recent Year
Tennessee (2003-2011)	8,193	1,065
Proposed Service Area	762	99
Iraq (2003-2013)	4,486	54
Afghanistan (2003-2013)	2,243	93

Source: Tennessee Statistics through 2011—Comm. D. Varney Presentation, Dec. 2012. Iraq and Afghanistan though 2013, U.S. casualties, from www.icasualties.org; Proposed service area is approx. 600,000 which is 9.3% of total Tennessee population of 6,450,000.

Service Area Among Highest Rates of Prescription Opioids

Opioid Prescription Rates by County TN, 2011



Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012.

East Tennessee Drug Overdose Death Rates at Crisis Levels and Growing

- **Nearly 10,000 people have died in Tennessee of drug overdoses in last ten years.**
- **Nearly 1,000 drug overdoses deaths in last ten years in proposed service area. (Approx. 10% of state population).**
- **Exploding growth rate of drug overdose deaths in Tennessee, doubling every ten years.**
- **At least another 10,000 drug overdose deaths in Tennessee in next ten years.**
- **Likely another 1,000 drug overdose deaths in proposed service area in next ten years.**

Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012; proposed service area which comprises approximately 10 percent of the state population.

How Can Need Be Satisfied with 100 Overdose Deaths in Service Area Every Year, and Still Increasing Dramatically, and Standard of Care Treatment Being 50 Miles Away?

- **How can anyone contend that drug addiction treatment is adequate in our proposed area with 1,000 dead over last ten years and at least another 1,000 projected over the next ten years?**
- **Presently the standard of care for opiate addiction, and certainly the standard of care for opiate-addicted pregnant women -- is more than 50 miles away.**
- **When a pregnant women has to drive 4,500 in the first 45 days of treatment for standard-of-care treatment to save her and her baby's life, how can anyone contend that need is being met?**
- **With drug overdose deaths easily topping 1,000 over the next ten years in our service area, we desperately need more treatment options and not fewer.**

Source: Death rates from TDMHSAS, Varney Presentation (2012).

2,000 New Tennessee Residents See Methadone Treatment Each Year

- **TDMHSAS reports 2,000 new patients annually to seek treatment at private-for-profit methadone (opioid) treatment centers in Tennessee.**
- **That translates into approximately 186 new people per year in the proposed service area, does not including pent up demand for lack of available treatment within 50 miles for years.**

Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012.

Nearly Three Tennesseans Die Every Day from a Drug Overdose

- **TDMHSAS reports 1,062 deaths from drug overdose in 2011**
- **That translates into nearly three deaths per day $(1,062/365) = 2.9$.**
- **That translates into almost one death every three days in the proposed service area of 600,000 people (which is 9.3% of state pop.)**

Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012. Proposed service area is approximately 600,000 people representing 9.3% of total state population of 6,450,000.

Projected 24,000 People Abuse Opiates in the Projected Service Area

- **Almost 5% of all Tennessee residents over 12 abused opiates in the last year.**
- **Over 12 equals 80% of total population (approx.)**
- **80% of 5% of 6,450,000 equals 258,000.**
- **80% of 5% of 600,000 service area equals 24,000**

Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012. Proposed service area is approximately 600,000 people representing 9.3% of total state population of 6,450,000. http://www.censusscope.org/us/s47/chart_age.html.

ACTION IS NEEDED RIGHT NOW:
Approximately 1,000 People Projected to Die from Drug Overdose in the Projected Service Area Over Next Ten Years

- **Even now, more than 1,000 die each year from drug overdose in Tennessee (1,062 in 2011).**
- **Death rate is more than doubling every ten years.**
- **Proposed service area population is 9.3% of the state population**
- **So approximately 100 people in the proposed service area are projected to die from drug overdose each year**
- **So approximately 1,000 will die in the proposed service area from drug overdose over the next ten years.**
- **Assuming growth rate of drug overdose deaths continues, deaths in proposed service area will exceed 1,500 over ten years.**

Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012. Proposed service area is approximately 600,000 people representing 9.3% of total state population of 6,450,000. http://www.censusscope.org/us/s47/chart_age.html.

“Prescription Drug Epidemic” in East Tennessee

Eastern Tennessee:

"It has just exploded.... Narcotic use is just rampant in our society, and our area is particularly bad. The babies are caught in the middle."

--John Buchheit, Director of Neonatology at East Tennessee Children's Hospital

“Over the past decade, prescription drug abuse has cut a destructive path through Appalachia. “

- -Dr. Robert P. Pack, ETSU, Johnson City, TN

Source: “Doctors See Surge in Newborns Hooked on Mothers' Pain Pills.” [USA Today](#); “Alarming High: Prescription Drug Abuse and the Pill Pipeline in Appalachia,” Dr. Robert P. Pack, ETSU, Johnson City, TN.

What is “Standard of Care?”

- **Treatment that is accepted by medical experts as a proper treatment for a certain type of disease and that is widely used by healthcare professionals.**
- **Also called “best practice,” “standard medical care,” and “standard therapy.”**

Source: National Cancer Institute at the National Institute of Health (<http://www.cancer.gov/dictionary?cdrid=346525>).

United States Dept. of Health and Human Services: “Methadone Can Save Your Baby’s Life”

- “Methadone Maintenance Treatment can prevent the withdrawal symptoms many drug users experience.”
- “Withdrawal for pregnant women is especially dangerous because it causes the uterus to contract and may bring on miscarriage or premature birth.”
- “By blocking withdrawal symptoms, **Methadone Maintenance Treatment can save your baby's life.**”
- “Additionally, Methadone Maintenance Treatment can help you stop using needles, which is a primary route of infection for drug users.”
- “More importantly, it can allow you to regain your quality of life.”

Source: U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Substance Abuse and Mental Health Services Administration
Center for Substance Abuse Treatment
www.samhsa.gov

Distance is a Barrier to Treatment

- “Generally, the closer one lives to a treatment program, the greater likelihood of participation.”
- **“The rate of participation is nearly twice as high for persons living in or close to one of the five counties that house programs, 59.0/100,000, than the rate for those that live 60 miles or more from a program, 32.2/100,000.”**

Source: Response to Public Chapter 363 of the Acts of the 2001 General Assembly Methadone Treatment Facilities Report prepared by Tennessee Department of Health in Consultation with the Methadone Task Force, Health Care Facilities Commission and Board for Licensing Health Care Facilities, The Tennessee Department of Health, 2001.

The Standard of Care for Opiate Addiction Treatment is Methadone

- **This standard of care treatment proven with over 50 years of experience.**
- **More than 1,300 programs in every state.**
- **Twelve clinics already established in Tennessee.**
- **Very successful Opiate Treatment Programs in many Tennessee cities.**

A Pregnant Woman in Johnson City Must Drive up to 4,500 Miles in the First 45 Days for Doctor-Prescribed, Standard-of-Care Methadone Maintenance Treatment

- **A pregnant woman must drive 100 miles per day for doctor-prescribed, standard-of-care, life-saving treatment during up to the first three months of treatment because no such treatment is available in Johnson City.**
- **Obviously, this is a horrific, unnecessary burden on any person---especially for pregnant women.**

Economic Feasibility

- **Will be Only Source of Standard-of-Care Treatment for Many Patients—including Pregnant Women.**
- **Applicant Manager has five years experience in operation of Multiple OTP Programs**
- **Applicant Manager former Chief Operating Officer of Multiple OTP Programs**
- **Applicant Manager Successfully Located and Opened Nine OTP Programs in Multiple Communities**

Source: TDMHSAS Commissioner E. Douglas Varney, Governor's Safety Forum Presentation, Governor's Action Plan with Concentration on Prescription Drug Abuse, December 6, 2012.

Orderly Development

The three basic types of treatment for opiate addiction:

- **Abstinence-Based Treatment—up to 90% relapse rate.¹**
- **Buprenorphine-based treatment administered in a doctors office, and**
- **Licensed opiate treatment programs provide the two treatments above plus methadone maintenance treatment or MMT.**

Source: 1. “Lapse And Relapse Following Inpatient Treatment of Opiate Dependence” 2010, 103 (6):176-9 Irish Med J. (Follow-up interviews were conducted with 109 patients, of whom, 99 (91%) reported a relapse.). A US follow-up study of 10 000 opiate addicts (the Drug Abuse Reporting Program; Simpson & Friend, 1988) found 88% relapse rate for abstinence-based treatment. Advances in Psychiatric Treatment (2003), vol. 9, 280–288.

Orderly Development

An Opiate Treatment Program is the front line in the community for many public health issues:

- **Testing for HIV, hepatitis and TB**
- **Concurrent medical conditions that we refer for treatment such as alcoholism or addiction to benzodiazepines**
- **Coordination of primary care with primary care physicians**
- **Care of pregnant women with their primary care physician, and**
- **Referrals for disorders such as schizophrenia and bipolar, which are beyond the scope of our care.**
- **These programs are often then only times these patients receive ANY mental or mental health screening.**

U.S. Government: Opiate Treatment Programs Have Not Significantly Caused Increase in Overdose Deaths

- “Increases in Methadone-Associated Mortality Are Related to Its Use as an Analgesic [i.e., pain management].”
- “Examination of the data available to the National Assessment participants indicates that OTPs [Opiate Treatment Programs] and the 2001 regulatory changes did not have a significant effect on rates of methadone-associated mortality.”
- “In the cases in which the sources of methadone associated with deaths could be traced, OTPs [Opiate Treatment Programs] did not appear to be involved.”

Source: Methadone-Associated Mortality: Report of a National Assessment, U.S. Dept. Health Humans Services (2004)(Part 4).

Methadone Maintenance Treatment Can “Dramatically” Reduce Deaths from Drug Overdoses

- “Methadone Maintenance Treatment dramatically reduces deaths from drug overdoses....”¹.
- Ten Fold Decrease in Chance of Death for those patients in MMT treatment versus on the waiting list for MMT treatment.²
- A study in the British Medical Journal has found that methadone treatment improves the survival of drug users and prevents addiction-related deaths.³
- Patients in MMT tended to use heroin less frequently, and that the treatment was associated with a 13 per cent reduced risk of death each year.⁴

Source: 1. World Health Organization (<http://www.who.int/bulletin/volumes/91/2/12-109132/en/index.html>) Hedrich D, Alves P, Farrell M, Stöver H, Møller L, Mayet S. The effectiveness of opioid maintenance treatment in prison settings: a systematic review. *Addiction* 2012;107:501–17. doi:10.1111/j.1360-0443.2011.03676.x PMID:21955033. 2. *J Addict Med.* 2013 May-Jun;7(3):177-82. doi: 10.1097/ADM.0b013e318287cfc9. Opiate-dependent patients on a waiting list for methadone maintenance treatment are at high risk for mortality until treatment entry. 3. Research: Risk Of Death During And After Opiate Substitution Treatment In Primary Care: Prospective Observational Study In UK General Practice Research Database, *BMJ* 2010 ;341: c5475. 4. Survival And Cessation In Injecting Drug Users: Prospective Observational Study Of Outcomes And Effect Of Opiate Substitution Treatment, *BMJ* 2010; 341 doi: <http://dx.doi.org/10.1136/bmj.c3172> (Published 1 July 2010),

Women warned not to use two drugs around pregnancy

March 22nd, 2012 11:04 pm by RICK WAGNER

KINGSFORT — If you are pregnant, trying to get pregnant or not using birth control, don't take Subutex or Suboxone, for the sake of your unborn child.

And if you are a physician, don't continue to prescribe those drugs containing buprenorphine to anyone who is pregnant.

Those are the messages of some local doctors say newborns affected by mothers taking those drugs — designed to help ease people off opioids — can suffer irritability, jitteriness, tremors, sneezing, diarrhea, seizures, inconsolable crying, poor sleep, poor feeding, breathing problems and persistent weight loss.

Beset with an increase in the number of babies born addicted to drugs, Mountain States Health Alliance has launched an initiative targeting about 100 greater Tri-Cities physicians approved by federal authorities to dispense the drugs.

MSHA facilities in Tennessee have seen a 31.3 percent increase in babies born addicted to drugs comparing a seven-month period from July 10, 2010, to Feb. 11, 2011, to the period of July 11 to Feb. 23, 2012. The seven-month 2010-11 total was 99, versus 130 in the seven months of 2011-12. The numbers are from Johnson City Medical Center, Indian Path Medical Center, Franklin Woods Community Hospital, the former Johnson City Specialty Hospital and Sycamore Shoals Hospital.

Wellmont spokesman Jim Wozniak said that 20 percent of the infants in Kingsport's Holston Valley Medical Center's Neonatal Intensive Care Unit were there for neonatal abstinence syndrome, and that the longest treatment for those has been 45 days.

"This takes a lot of resources to care for these children," Wozniak said Thursday afternoon.

Dr. Joy Anderson, a Mountain States Medical Group obstetrician and gynecologist practicing in Kingsport, said pregnant women are being told by physicians prescribing the two drugs "it's a safe drug in pregnancy" when it is not.

At a Thursday morning news conference at Indian Path Medical Center, Anderson said two other MSHA providers said they are particularly concerned about the prevalent use among pregnant women of prescription opiates, Suboxone and Suboxone, both used to treat opiate addiction.

Lisa Smithgall, vice president of women's service for MSHA, said the increase puts a strain on the health care and health insurance, including the public TennCare system.

In most instances, Anderson said, the drugs are given in an effort to wean the woman off opiates such as OxyContin.

Anderson said that if a woman is not willing to forgo Subutex and Suboxone, she should defer become pregnant. Options for already pregnant woman include detoxification no later than two months before birth, with appropriate tests of the unborn child. Methadone is the recommended medication used for detoxification during pregnancy, the MSHA literature says.

She said the same avoidance strategy goes for smoking tobacco and drinking alcohol — which Dr. Des Bharti, a neonatologist and East Tennessee State University professor, said are the No. 1 and No. 2 drugs taken by pregnant woman — as well as diabetics keeping their blood sugar under control.

Bharti said when he first came to Johnson City Medical Center in 1990, one or two drug-addicted newborns came into the



world there a year, a number he said has grown to about 50 a year now.

Anderson said that 60 percent of users of Subutex and Suboxone during pregnancy are also using completely illegal drugs or alcohol.

In the Tri-Cities, he said about 30 percent of pregnant woman smoke, compared to 15 percent nationwide. And of those using Subutex or Suboxone, he said about half got the drug illegally on the street, not through a prescription.

Bharti said those drugs have in many instances replaced methadone, legally with a prescription and illegally without one. Aside from immediate health problems, the babies face long-range problems, particularly with future pain management needs. Bharti said the normal cost of a birth and two days in a hospital for a newborn is \$2,000 to \$3,000, compared to \$15,000 to \$50,000 for a 10-day stay including a neonatal intensive care unit, while he said the lifetime cost of care is an estimated \$1.5 million per child — with about 50 percent being on TennCare. He also said that the difficulty in taking care of the drug-addicted babies can lead to more physical abuse of them.

And in some cases, symptoms of the addiction won't emerge in the first two days, which Bharti said means some infants are sent home addicted with no special treatment.

Dr. Amy Marlow, an MSMG Pediatrics pediatrician in Kingsport, said doctors often seek a neonatologist's advice and strive to make sure addicted babies get follow-up care at home.

Since Subutex and Suboxone became legal to help with opioids withdrawal, Marlow said many of the addicted newborns are going to foster care and have issues with growth, failure to thrive and developmental delays. She said long-term studies on the drugs' effects on newborns as they grow up do not yet exist, but she suspects learning problems, including attention deficit disorder, mental retardation and low IQs would be among outcomes.

That's why she said MSHA sent the letter, background information and brochures to 88 providers on a list of those that issue the drugs and on a case-by-case basis to other providers not on the list but able to prescribe the drugs.

Ninety-four doctors signed off on the letter, which she said also seeks community support and awareness.

"We hope everyone can help us with this communication," Marlow said.

Bharti said Subutex and Suboxone both contain buprenorphine, but Suboxone has another medicine included that counters the high that results in crushing the pills and injecting the powder. Subutex is all buprenorphine, Bharti said.

He said doctors can issue prescriptions for Suboxone after attending an eight-hour class.